KONICA MINOLTA

SERVICE MANUAL

THEORY OF OPERATION

magicolor 4690MF

2008.05

KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

THEORY OF OPERATION TOTAL CONTENTS

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SAFETY AND IMPORTANT WARNING ITEMS

Read carefully the safety and important warning Items described below to understand them before doing service work.

IMPORTANT NOTICE

Because of possible hazards to an inexperienced person servicing this product as well as the risk of damage to the product, KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. (hereafter called the KMBT) strongly recommends that all servicing be performed only by KMBT-trained service technicians.
Changes may have been made to this product to improve its performance after this Service Manual was printed. Accordingly, KMBT does not warrant, either explicitly or implicitly, that the information contained in this service manual is complete and accurate.
The user of this service manual must assume all risks of personal injury and/or damage to the product while servicing the product for which this service manual is intended.
Therefore, this service manual must be carefully read before doing service work both in the course of technical training and even after that, for performing maintenance and control of the product properly.
Keep this service manual also for future service.

DESCRIPTION ITEMS FOR DANGER, WARNING AND CAUTION

In this service manual, each of three expressions "⚠ DANGER", "⚠ WARNING", and "⚠ CAUTION" is defined as follows together with a symbol mark to be used in a limited meaning.
When servicing the product, the relevant works (disassembling, reassembling, adjustment, repair, maintenance, etc.) need to be conducted with utmost care.

⚠ **DANGER: Action having a high possibility of suffering death or serious injury**

⚠ **WARNING: Action having a possibility of suffering death or serious injury**

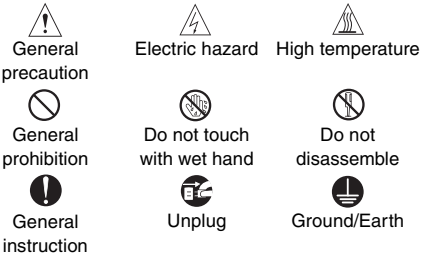
⚠ **CAUTION: Action having a possibility of suffering a slight wound, medium trouble, and property damage**

Symbols used for safety and important warning items are defined as follows:

△ :Precaution when servicing the product.

⃠ :Prohibition when servicing the product.

● :Direction when servicing the product.



SAFETY WARNINGS

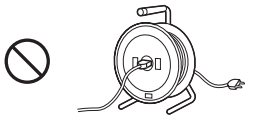
[1] MODIFICATIONS NOT AUTHORIZED BY KONICA MINOLTA BUSINESS TECHNOLOGIES, INC.

KONICA MINOLTA brand products are renowned for their high reliability. This reliability is achieved through high-quality design and a solid service network.
Product design is a highly complicated and delicate process where numerous mechanical, physical, and electrical aspects have to be taken into consideration, with the aim of arriving at proper tolerances and safety factors. For this reason, unauthorized modifications involve a high risk of degradation in performance and safety. Such modifications are therefore strictly prohibited. the points listed below are not exhaustive, but they illustrate the reasoning behind this policy.

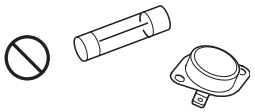
Prohibited Actions

⚠ DANGER

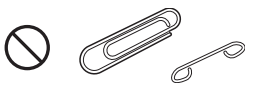
- Using any cables or power cord not specified by KMBT.



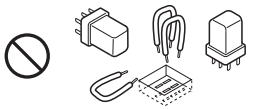
- Using any fuse or thermostat not specified by KMBT. Safety will not be assured, leading to a risk of fire and injury.



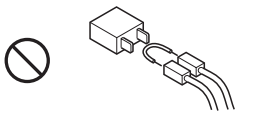
- Disabling fuse functions or bridging fuse terminals with wire, metal clips, solder or similar object.



- Disabling relay functions (such as wedging paper between relay contacts)

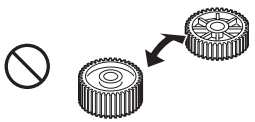


- Disabling safety functions (interlocks, safety circuits, etc.) Safety will not be assured, leading to a risk of fire and injury.



- Making any modification to the product unless instructed by KMBT

- Using parts not specified by KMBT



[2] POWER PLUG SELECTION

In some countries or areas, the power plug provided with the product may not fit wall outlet used in the area. In that case, it is obligation of customer engineer (hereafter called the CE) to attach appropriate power plug or power cord set in order to connect the product to the supply.

Power Cord Set or Power Plug

⚠ WARNING

- Use power supply cord set which meets the following criteria:
  - provided with a plug having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - provided with three-conductor cable having enough current capacity, and
  - the cord set meets regulatory requirements for the area.

  Use of inadequate cord set leads to fire or electric shock.

- Attach power plug which meets the following criteria:
  - having configuration intended for the connection to wall outlet appropriate for the product's rated voltage and current, and
  - the plug has pin/terminal(s) for grounding, and
  - meets regulatory requirements for the area.

  Use of inadequate cord set leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

- Conductors in the power cable must be connected to terminals of the plug according to the following order:
  - Black or Brown: L (line)
  - White or Light Blue: N (neutral)
  - Green/Yellow: PE (earth)

  Wrong connection may cancel safeguards within the product, and results in fire or electric shock.

[3] CHECKPOINTS WHEN PERFORMING ON-SITE SERVICE

KONICA MINOLTA brand products are extensively tested before shipping, to ensure that all applicable safety standards are met, in order to protect the customer and customer engineer (hereafter called the CE) from the risk of injury. However, in daily use, any electrical equipment may be subject to parts wear and eventual failure. In order to maintain safety and reliability, the CE must perform regular safety checks.

1. Power Supply

Connection to Power Supply

⚠ WARNING

- Check that mains voltage is as specified.

  Connection to wrong voltage supply may result in fire or electric shock.

- Connect power plug directly into wall outlet having same configuration as the plug.

  Use of an adapter leads to the product connecting to inadequate power supply (voltage, current capacity, grounding), and may result in fire or electric shock.

  If proper wall outlet is not available, advice the customer to contact qualified electrician for the installation.

- Plug the power cord into the dedicated wall outlet with a capacity greater than the maximum power consumption.

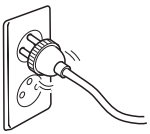
  If excessive current flows in the wall outlet, fire may result.

- If two or more power cords can be plugged into the wall outlet, the total load must not exceed the rating of the wall outlet.

  If excessive current flows in the wall outlet, fire may result.

- Make sure the power cord is plugged in the wall outlet securely.

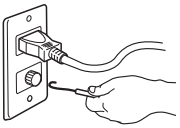
  Contact problems may lead to increased resistance, overheating, and the risk of fire.



- Check whether the product is grounded properly.

  If current leakage occurs in an ungrounded product, you may suffer electric shock while operating the product.

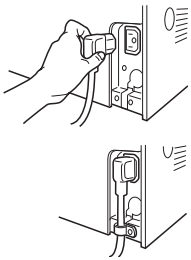
  Connect power plug to grounded wall outlet.



Power Plug and Cord

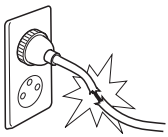
⚠ WARNING

- When using the power cord set (inlet type) that came with this product, make sure the connector is securely inserted in the inlet of the product.
  When securing measure is provided, secure the cord with the fixture properly.
  If the power cord (inlet type) is not connected to the product securely, a contact problem may lead to increased resistance, overheating, and risk of fire.

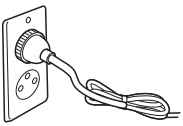


- Check whether the power cord is not stepped on or pinched by a table and so on.
  Overheating may occur there, leading to a risk of fire.

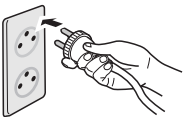
- Check whether the power cord is damaged. Check whether the sheath is damaged.
  If the power plug, cord, or sheath is damaged, replace with a new power cord (with plug and connector on each end) specified by KMBT. Using the damaged power cord may result in fire or electric shock.



- Do not bundle or tie the power cord.
  Overheating may occur there, leading to a risk of fire.

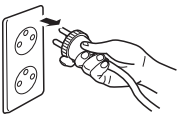


- Check whether dust is collected around the power plug and wall outlet.
  Using the power plug and wall outlet without removing dust may result in fire.



- Do not insert the power plug into the wall outlet with a wet hand.
  The risk of electric shock exists.

- When unplugging the power cord, grasp the plug, not the cable.
  The cable may be broken, leading to a risk of fire and electric shock.

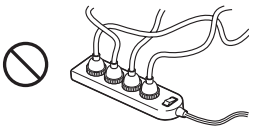


Wiring

⚠ WARNING

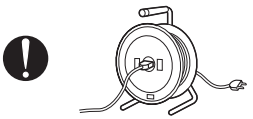
- Never use multi-plug adapters to plug multiple power cords in the same outlet.

  If used, the risk of fire exists.



- When an extension cord is required, use a specified one. Current that can flow in the extension cord is limited, so using a too long extension cord may result in fire.

  Do not use an extension cable reel with the cable taken up. Fire may result.



2. Installation Requirements

Prohibited Installation Places

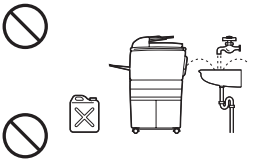
⚠ WARNING

- Do not place the product near flammable materials or volatile materials that may catch fire.

  A risk of fire exists.

- Do not place the product in a place exposed to water such as rain.

  A risk of fire and electric shock exists.

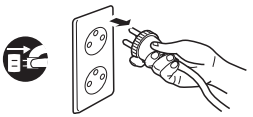


When not Using the Product for a long time

⚠ WARNING

- When the product is not used over an extended period of time (holidays, etc.), switch it off and unplug the power cord.

  Dust collected around the power plug and outlet may cause fire.



Ventilation

⚠ CAUTION

- The product generates ozone gas during operation, but it will not be harmful to the human body.

  If a bad smell of ozone is present in the following cases, ventilate the room.

  a. When the product is used in a poorly ventilated room
  b. When taking a lot of copies
  c. When using multiple products at the same time

Stability

⚠ CAUTION

- Be sure to lock the caster stoppers.

  In the case of an earthquake and so on, the product may slide, leading to a injury.

Inspection before Servicing

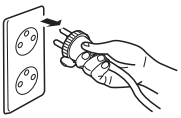
⚠ CAUTION

- Before conducting an inspection, read all relevant documentation (service manual, technical notices, etc.) and proceed with the inspection following the prescribed procedure in safety clothes, using only the prescribed tools. Do not make any adjustment not described in the documentation.

  If the prescribed procedure or tool is not used, the product may break and a risk of injury or fire exists.

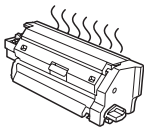
- Before conducting an inspection, be sure to disconnect the power plugs from the product and options.

  When the power plug is inserted in the wall outlet, some units are still powered even if the POWER switch is turned OFF. A risk of electric shock exists.



- The area around the fixing unit is hot.

  You may get burnt.

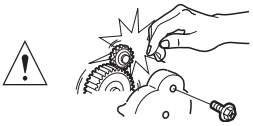


Work Performed with the Product Powered On

⚠ WARNING

- Take every care when making adjustments or performing an operation check with the product powered.

  If you make adjustments or perform an operation check with the external cover detached, you may touch live or high-voltage parts or you may be caught in moving gears or the timing belt, leading to a risk of injury.



- Take every care when servicing with the external cover detached.

  High-voltage exists around the drum unit. A risk of electric shock exists.

Safety Checkpoints

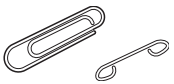
⚠ WARNING

- Check the exterior and frame for edges, burrs, and other damage.

  The user or CE may be injured.

- Do not allow any metal parts such as clips, staples, and screws to fall into the product.

  They can short internal circuits and cause electric shock or fire.



- Check wiring for squeezing and any other damage.

  Current can leak, leading to a risk of electric shock or fire.

- Carefully remove all toner remnants and dust from electrical parts and electrode units such as a charging corona unit.

  Current can leak, leading to a risk of product trouble or fire.

- Check high-voltage cables and sheaths for any damage.

  Current can leak, leading to a risk of electric shock or fire.

Safety Checkpoints

⚠ WARNING

- Check electrode units such as a charging corona unit for deterioration and sign of leakage.

  Current can leak, leading to a risk of trouble or fire.

- Before disassembling or adjusting the write unit (P/H unit) incorporating a laser, make sure that the power cord has been disconnected.

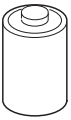
  The laser light can enter your eye, leading to a risk of loss of eyesight.

- Do not remove the cover of the write unit. Do not supply power with the write unit shifted from the specified mounting position.

  The laser light can enter your eye, leading to a risk of loss of eyesight.

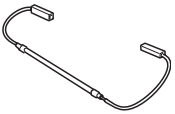
- When replacing a lithium battery, replace it with a new lithium battery specified in the Parts Guide Manual. Dispose of the used lithium battery using the method specified by local authority.

  Improper replacement can cause explosion.



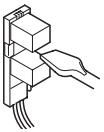
- After replacing a part to which AC voltage is applied (e.g., optical lamp and fixing lamp), be sure to check the installation state.

  A risk of fire exists.



- Check the interlock switch and actuator for loosening and check whether the interlock functions properly.

  If the interlock does not function, you may receive an electric shock or be injured when you insert your hand in the product (e.g., for clearing paper jam).



- Make sure the wiring cannot come into contact with sharp edges, burrs, or other pointed parts.

  Current can leak, leading to a risk of electric shock or fire.

Safety Checkpoints

⚠ WARNING

- Make sure that all screws, components, wiring, connectors, etc. that were removed for safety check and maintenance have been reinstalled in the original location. (Pay special attention to forgotten connectors, pinched cables, forgotten screws, etc.)

  A risk of product trouble, electric shock, and fire exists.

Handling of Consumables

⚠ WARNING

- Toner and developer are not harmful substances, but care must be taken not to breathe excessive amounts or let the substances come into contact with eyes, etc. It may be stimulative.

  If the substances get in the eye, rinse with plenty of water immediately. When symptoms are noticeable, consult a physician.

- Never throw the used cartridge and toner into fire.

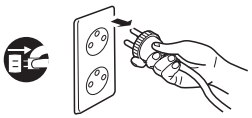
  You may be burned due to dust explosion.

Handling of Service Materials

⚠ CAUTION

- Unplug the power cord from the wall outlet.

  Drum cleaner (isopropyl alcohol) and roller cleaner (acetone-based) are highly flammable and must be handled with care. A risk of fire exists.



- Do not replace the cover or turn the product ON before any solvent remnants on the cleaned parts have fully evaporated.

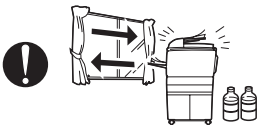
  A risk of fire exists.

Handling of Service Materials

⚠ CAUTION

- Use only a small amount of cleaner at a time and take care not to spill any liquid. If this happens, immediately wipe it off.
  A risk of fire exists.

- When using any solvent, ventilate the room well.
  Breathing large quantities of organic solvents can lead to discomfort.



[4] Used Batteries Precautions

ALL Areas

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Germany

VORSICHT!

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.
Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

France

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.
Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Denmark

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

Finland, Sweden

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

Norway

ADVARSEL

Eksplosjonsfare ved feilaktig skifte av batteri.
Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
Brukte batterier kasseres i henhold til fabrikantens instruksjoner.

[5] Laser Safety

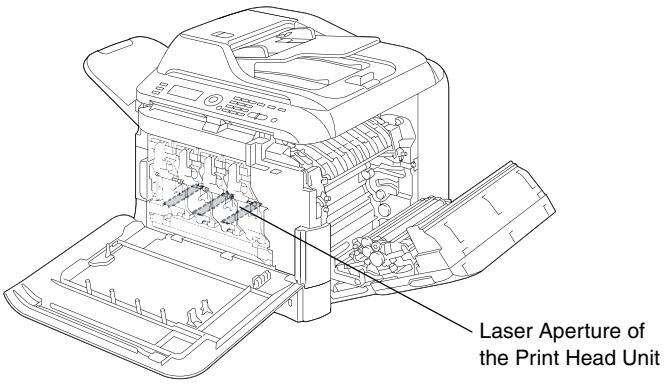
- This is a digital machine certified as a Class 1 laser product. There is no possibility of danger from a laser, provided the machine is serviced according to the instruction in this manual.

5.1 Internal Laser Radiation

semiconductor laser	
Maximum power of the laser diode	15 mW
Maximum average radiation power (*)	8.5 µW
Wavelength	770-800 nm

*at laser aperture of the Print Head Unit

- This product employs a Class 3B laser diode that emits an invisible laser beam. The laser diode and the scanning polygon mirror are incorporated in the print head unit.
- The print head unit is NOT A FIELD SERVICEABLE ITEM. Therefore, the print head unit should not be opened under any circumstances.



U.S.A., Canada
(CDRH Regulation)

- This machine is certified as a Class 1 Laser product under Radiation Performance Standard according to the Food, Drug and Cosmetic Act of 1990. Compliance is mandatory for Laser products marketed in the United States and is reported to the Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration of the U.S. Department of Health and Human Services (DHHS). This means that the device does not produce hazardous laser radiation.

- The label shown on page S-16 indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

CAUTION
- **Use of controls, adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.**

semiconductor laser	
Maximum power of the laser diode	15 mW
Wavelength	770-800 nm

All Areas

CAUTION
- **Use of controls, adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.**

semiconductor laser	
Maximum power of the laser diode	15 mW
Wavelength	770-800 nm

Denmark

ADVARSEL
- **Usynlig laserstråling ved åbning, når sikkerhedsafbrydere er ude af funktion. Undgå udsættelse for stråling. Klasse 1 laser produkt der opfylder IEC60825-1 sikkerheds kravene.**

halvlederlaser	
Laserdiodens højeste styrke	15 mW
bølgelængden	770-800 nm

Finland, Sweden

LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT

VAROITUS!
- **Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.**

puolijohdelaser	
Laserdiodin suurin teho	15 mW
aallonpituus	770-800 nm

VARNING!
- **Om apparaten används på annat sätt än i denna bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.**

halvledarlaser	
Den maximala effekten för laserdioden	15 mW
våglängden	770-800 nm

VARO!
- **Avattaessa ja suojalukitus ohitettaessa olet alttiina näkymättomälle lasersäteilylle. Älä katso säteeseen.**

VARNING!
- **Osynlig laserstråining när denna del är öppnad och spärren är urkopplad. Betrakta ej stråien.**

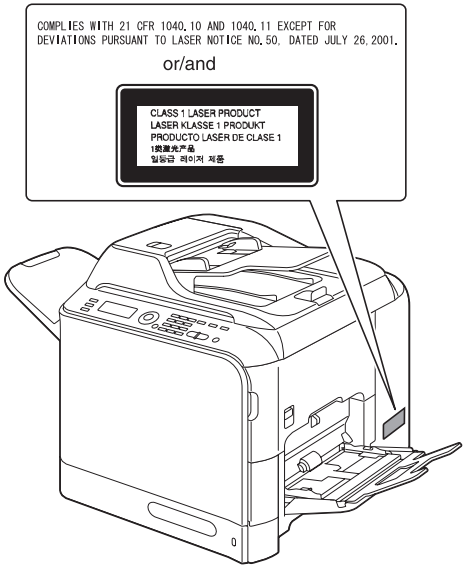
Norway

ADVERSEL
- **Dersom apparatet brukes på annen måte enn spesifisert i denne bruksanvisning, kan brukeren utsettes för unsynlig laserstrålning, som overskrider grensen for laser klass 1.**

halvleder laser	
Maksimal effekt till laserdiode	15 mW
bølgelengde	770-800 nm

5.2 Laser Safety Label

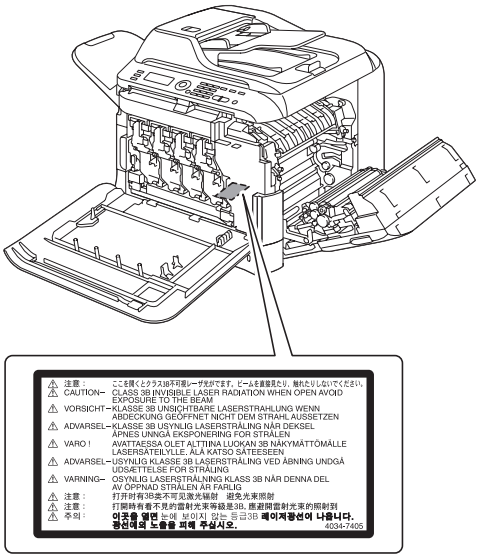
- A laser safety label is attached to the inside of the machine as shown below.


COMPLIES WITH 21 CFR 1040.10 AND 1040.11 EXCEPT FOR
DEVIATIONS PURSUANT TO LASER NOTICE NO.50, DATED JULY 26,2001.
or/and
CLASS 1 LASER PRODUCT
LASER KLASSE 1 PRODUKT
PRODUCTO LASER DE CLASE 1
1등급 레이저 제품

A0FDP0E500DA

5.3 Laser Caution Label

- A laser caution label is attached to the outside of the machine as shown below.


⚠ 注意 : ここを開くとクラス3B不可視レーザ光があります。ビームを直接見たり、触れたりしないでください。
⚠ CAUTION– CLASS 3B INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO THE BEAM
⚠ VORSICHT– KLASSE 3B UNSICHTBARE LASERSTRAHLUNG WENN ABDECKUNG GEÖFFNET NICHT DEM STRAHL AUSSETZEN
⚠ ADVARSEL– KLASSE 3B USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES UNNGÅ EKSPONERING FOR STRÅLEN
⚠ VARO ! AVATTAESSA OLET ALTTIINA LUOKAN 3B NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE, ÄLÄ KATSO SÄTEESEEN
⚠ ADVARSEL– USYNLIG KLASSE 3B LASERSTRÅLING VED ÅBNING UNDGÅ UDSÆTTELSE FOR STRÅLING
⚠ VARNING– OSYNLIG LASERSTRÅLNING KLASS 3B NÄR DENNA DEL AV ÖPPNAD STRÅLEN ÄR FARLIG
⚠ 注意 : 打开时有不见激光辐射，避免光束照射
⚠ 注意 : 打開時有看不見的雷射光束等級是3B, 應避開雷射光束的照射到
⚠ 주의 : 이곳을 열면 눈에 보이지 않는 등급3B 레이저광선이 나옵니다. 광선에의 노출을 피해 주십시오. 4034-7405

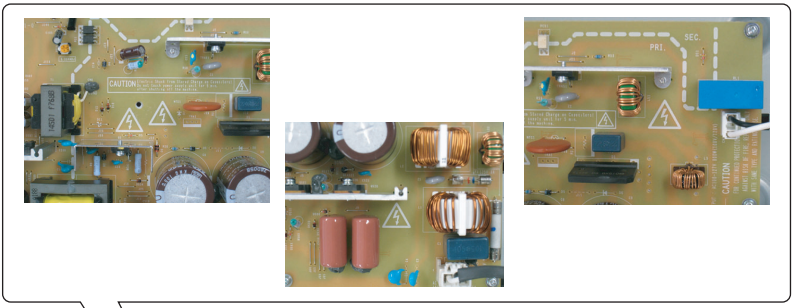
A0FDP0E501DA

5.4 PRECAUTIONS FOR HANDLING THE LASER EQUIPMENT

- When laser protective goggles are to be used, select ones with a lens conforming to the above specifications.
- When a disassembly job needs to be performed in the laser beam path, such as when working around the printerhead and PC Drum, be sure first to turn the printer OFF.
- If the job requires that the printer be left ON, take off your watch and ring and wear laser protective goggles.
- A highly reflective tool can be dangerous if it is brought into the laser beam path. Use utmost care when handling tools on the user's premises.
- The Print Head is not to be disassembled or adjusted in the field. Replace the Unit or Assembly including the Control Board. Therefore, remove the Laser Diode, and do not perform Control Board trimmer adjustment.

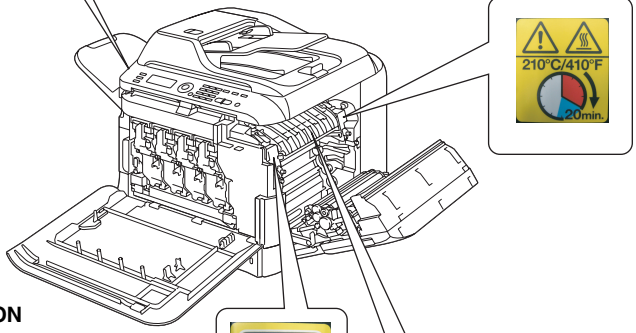
WARNING INDICATIONS ON THE MACHINE

Caution labels shown are attached in some areas on/in the machine.
When accessing these areas for maintenance, repair, or adjustment, special care should be taken to avoid burns and electric shock.



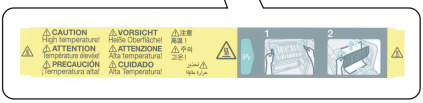
High voltage

- **This area generates high voltage. Be careful not to touch here when the power is turned ON to avoid getting an electric shock.**



CAUTION

- **The area around the Fuser Unit is extremely hot. Touching any part other than those indicated may result in burns.**



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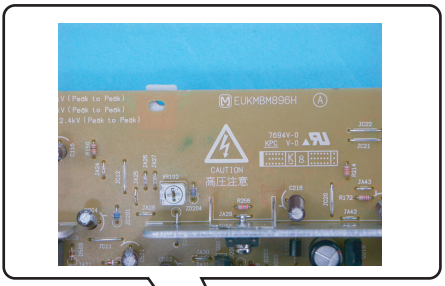
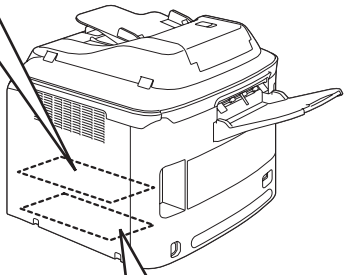


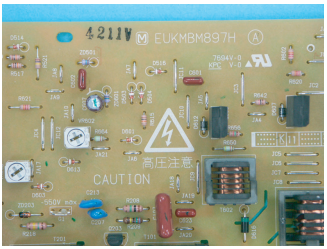
High voltage

- **This area generates high voltage.**
  Be careful not to touch here when the power is turned ON to avoid getting an electric shock.

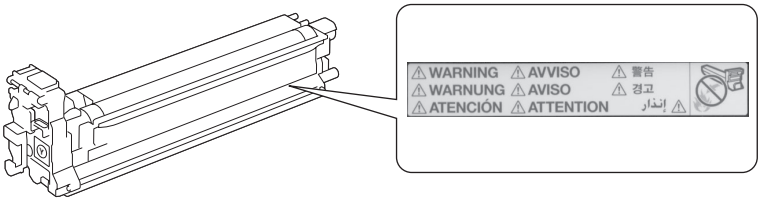


High voltage

- **This area generates high voltage.**
  Be careful not to touch here when the power is turned ON to avoid getting an electric shock.

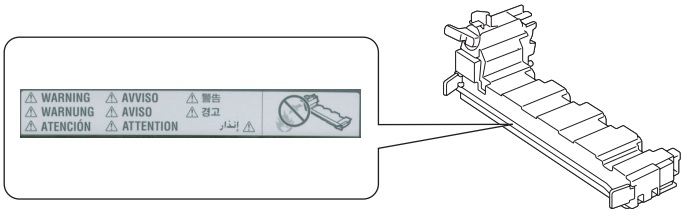


A0FDP0C504DA



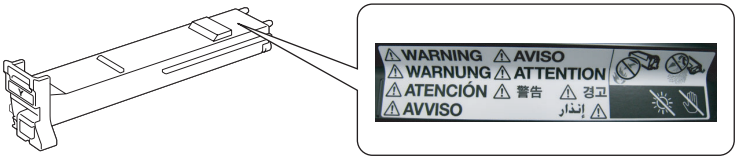
WARNING

- **Do not burn used Print Units.**
  Toner expelled from the fire is dangerous.



WARNING

- **Do not burn used Waste Toner Bottle.**
  Toner expelled from the fire is dangerous.



WARNING

- **Do not burn used Toner Cartridge.**
  Toner expelled from the fire is dangerous.

A00FP0C504DA

CAUTION:

- **You may be burned or injured if you touch any area that you are advised by any caution label to keep yourself away from. Do not remove caution labels. And also, when the caution label is peeled off or soiled and cannot be seen clearly, replace it with a new caution label.**

MEASURES TO TAKE IN CASE OF AN ACCIDENT

1. If an accident has occurred, the distributor who has been notified first must immediately take emergency measures to provide relief to affected persons and to prevent further damage.
2. If a report of a serious accident has been received from a customer, an on-site evaluation must be carried out quickly and KMBT must be notified.
3. To determine the cause of the accident, conditions and materials must be recorded through direct on-site checks, in accordance with instructions issued by KMBT.
4. For reports and measures concerning serious accidents, follow the regulations specified by every distributor.

Composition of the service manual

This service manual consists of Theory of Operation section and Field Service section to explain the main machine and its corresponding options.

Theory of Operation section gives, as information for the CE to get a full understanding of the product, a rough outline of the object and role of each function, the relationship between the electrical system and the mechanical system, and the timing of operation of each part.

Field Service section gives, as information required by the CE at the site (or at the customer's premise), a rough outline of the service schedule and its details, maintenance steps, the object and role of each adjustment, error codes and supplementary information.

The basic configuration of each section is as follows. However some options may not be applied to the following configuration.

<Theory of Operation section>

OUTLINE:	Explanation of system configuration, product specifications, unit configuration, and paper path
COMPOSITION/OPERATION:	Explanation of configuration of each unit, operating system, and control system

<Field service section>

OUTLINE:	Explanation of system configuration, and product specifications
MAINTENANCE:	Explanation of service schedule, maintenance steps, service tools, removal/reinstallation methods of major parts, and firmware version up method etc.
ADJUSTMENT/SETTING:	Explanation of utility mode, service mode, and mechanical adjustment etc.
TROUBLESHOOTING:	Explanation of lists of jam codes and error codes, and their countermeasures etc.
APPENDIX:	Parts layout drawings, connector layout drawings, timing chart, overall layout drawing are attached.

Notation of the service manual

A. Product name

In this manual, each of the products is described as follows:

(1)	magicolor 4690MF	Main body
(2)	Microsoft Windows NT 4.0:	Windows NT 4.0 or Windows NT
	Microsoft Windows 2000:	Windows 2000
	Microsoft Windows XP:	Windows XP
	Microsoft Windows Vista:	Windows Vista
	When the description is made in combination of the OS's mentioned above:	
		Windows NT 4.0/2000
		Windows NT/2000/XP/Vista

B. Brand name

The company names and product names mentioned in this manual are the brand name or the registered trademark of each company.

C. Feeding direction

- When the long side of the paper is parallel with the feeding direction, it is called short edge feeding. The feeding direction which is perpendicular to the short edge feeding is called the long edge feeding.
- Short edge feeding will be identified with [S (abbreviation for Short edge feeding)] on the paper size. No specific notation is added for the long edge feeding.
  When the size has only the short edge feeding with no long edge feeding, [S] will not be added to the paper size.

<Sample notation>

Paper size	Feeding direction	Notation
A4	Long edge feeding	A4
	Short edge feeding	A4S
A3	Short edge feeding	A3

KONICA MINOLTA

SERVICE MANUAL THEORY OF OPERATION

magicolor 4690MF

Main Body

2008.05

KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, is shown at the left margin of the revised section.
  The number inside represents the number of times the revision has been made.

- To indicate clearly a page that contains the revision, is shown near the page number of the corresponding page.
  The number inside represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2008/05	1.0	—	Issue of the first edition

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magicolor 4690MF main body

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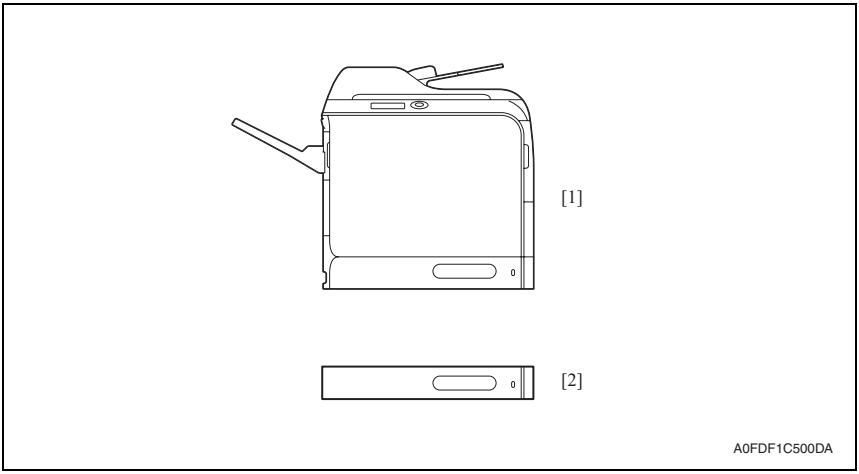
Outline

1. System configuration



[1] magicolor 4690MF

[2] Lower feeder unit

2. Product specifications

A. Type

Type	Desktop tandem full-color A4 laser beam printer
Printing system	Semiconductor laser and electrostatic image transfer to plain paper
Exposure system	4 laser diode and 1 polygon mirror
PC drum type	OPC (organic photo conductor)
Photoconductor cleaning	Blade cleaning system
Scan resolution	600 x 600 dpi, 600 x 300 dpi
Print resolution	2400 x 600 dpi, 1200 x 600 dpi, 600 x 600 dpi
Copy resolution	600 x 600 dpi, 1200 x 600 dpi
Platen	Stationary
Registration	Rear left edge
Paper feeding system	Tray1: 100 sheets Tray2: 250 sheets Tray3: 500 sheets (Option)
Developing system	Single-element developing system
Charging system	Needle charging system (with Ozone suction feature)
Image transfer system	Intermediate transfer belt system
Paper separating system	Curvature separation + charge-neutralizing system
Fusing system	Belt fusing
Paper exit system	Face down (Output tray capacity: 250 sheets)

B. Functions

Warm-up time	Cold start: 58 seconds Sleep-mode to ready: 40 seconds (Power on to ready, at ambient temperature of 23 °C/73.4 °F and rated source voltage)
Process speed	144 mm/sec (plain paper, Monochrome/full color mode) 72 mm/sec (thick paper/OHP, Monochrome/full color mode)
First-page-out-time	18.0 second (Full-color mode, A4S/LetterS, 1-sided mode, plain paper)
Print speed	24 pages/min. (A4S, 1-sided print, plain paper) 25 pages/min. (LetterS, 1-sided print, plain paper) 12 pages/min. (A4S, 1-sided print, thick paper) 12.5 pages/min. (LetterS, 1-sided print, thick paper)

C. Media

Type		Paper source (maximum tray capacity)	
		Tray 1	Tray 2
Media type	Plain paper (60 to 90 g/m²; 16 to 24 lb)	100 sheets	250 sheets
	Thick 1 (91 to 150 g/m²)	20 sheets	—
	Thick 2 (151 to 210 g/m²)		
	OHP		
	Label		
	Letterhead		
	Transparencies		
	Glossy 1 (100 to 128 g/m²)		
	Glossy 2 (129 to 158 g/m²)		
	Postcard		
	Envelope	10 sheets	
Media dimensions	Width	92 to 216 mm (3.6 to 8.5 inch)	92 to 216 mm (3.6 to 8.5 inch)
	Length	148 to 356 mm (5.8 to 14.0 inch)	148 to 297 mm (5.8 to 11.7 inch)

D. Maintenance

E. Machine specifications

Power requirements	Voltage:	AC 100V, 120 V, 220 to 240 V
	Frequency:	50 to 60 Hz ± 3 Hz
Max power consumption		1,250 W or less 25 W less (Energy saver mode)
Dimensions		539 (W) x 590 (D) x 578 (H) mm 21.23 (W) x 23.23 (D) x 22.75 (H) inch
Weight		50.0 kg (110.3 lb) or less without consumables 55.0 kg (121.3 lb) or less with consumables
Operating noise		During standby : 39 dB (A) or less During printing : 53.5 dB (A) or less During copying : 54.5 dB (A) or less (with ADF)

F. Operating environment

Temperature	10 °C to 35 °C / 50 °F to 95 °F (with a fluctuation of 10 °C / 18 °F or less per hour)
Humidity	15% to 85% (with a fluctuation of 20% or less per hour)

G. Print functions

Type	Built-in type controller	
System Requirements	Personal computer	Pentium II: 400 MHz or higher
		Power Mac G3 or later (G4 or later is recommended) Intel processor
	Operating system	Microsoft Windows Vista Home Basic/Home Premium/Ultimate/Business/Enterprise, Windows Vista Home Basic /Home Premium /Ultimate/Business /Enterprise x64 Edition, Windows XP Home Edition/Professional (Service Pack 1 or later; Service Pack 2 or later is recommended), Windows XP Professional x64 Edition, Windows Server 2003, Windows Server 2003 x64 Edition, Windows 2000 (Service Pack 4 or later)
		Mac OS X (10.2.8 or later; We recommend installing the newest patch)
	Free hard disk space	256 MB or more
	RAM	128 MB or more
	I/O Interfaces	10Base-T/100Base-TX (IEEE 802.3) Ethernet interface port
		USB Revision 2.0 and USB Revision 1.1 compliant port

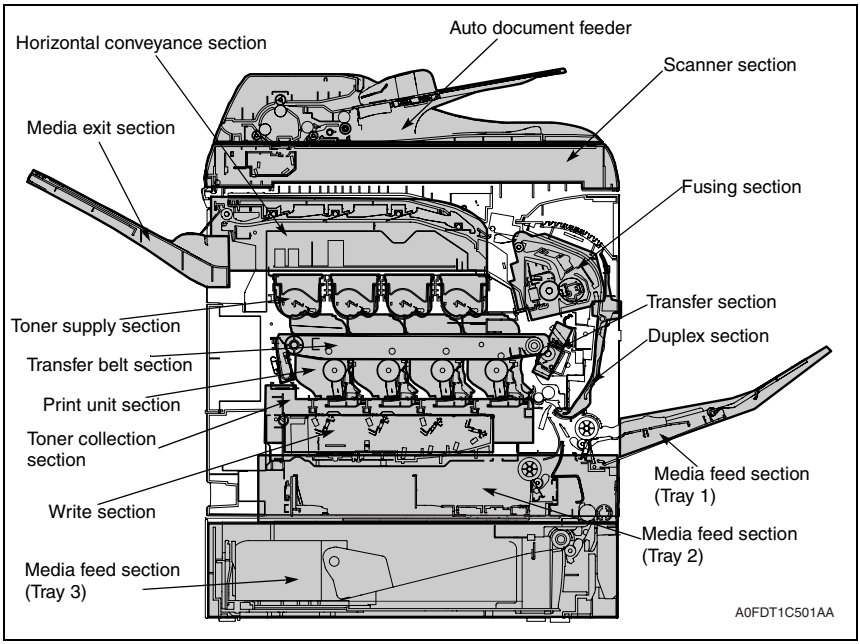
NOTE

- **These specifications are subject to change without notice.**

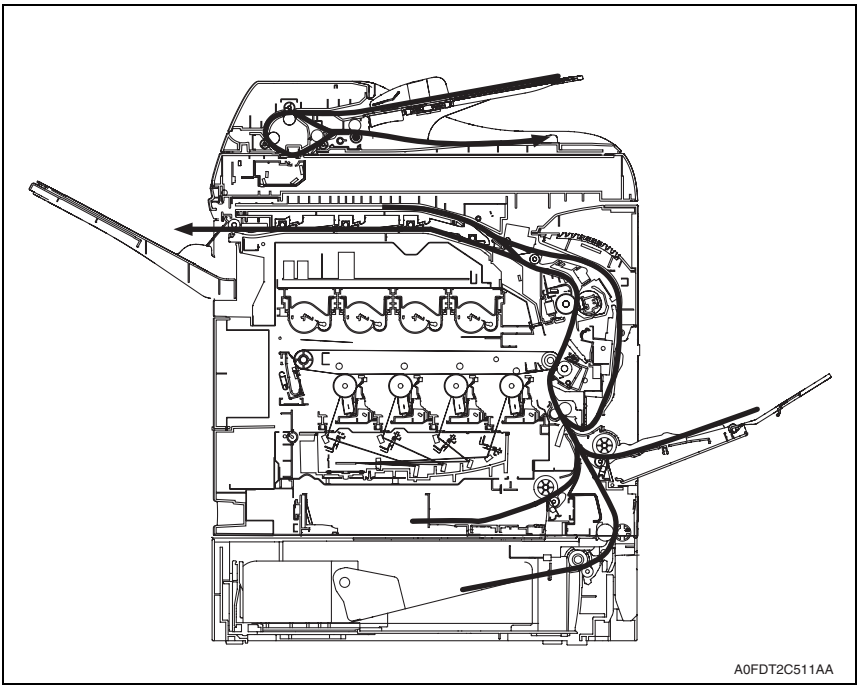
2.1 Fax specifications

Resolution	Standard (203 dpi x 98 dpi)	
	Fine (203 dpi x 196 dpi)	
	Super fine (203 dpi x 392 dpi)	
Halftone level	Standard/Fine/Super fine Halftone standard/Halftone fine/Halftone super fine	
Automatic reduction	Receive	Supported
	Transmit	Supported
Compatibility	ECM/Super G3	
Modem speed	V.34 (up to 33.6 Kbps)	
Transmit speed	3 second/page (at V.34)	
Compression	MH/MR/MMR/JBIG	
Memory for receiving	6 MB for Fax-RX (approx. 250 pages), (included in 32 MB NAND flash)	
Remote setting	Available via Tel line and USB	
Paper size	A4S, LegalS, LetterS	
Paper type	Plain paper, recycled paper	
Functions	Speed dial	220
	Group dial	20 groups (50 destination stations for one group)
	Broadcast	Available maximum 255 stations. (Speed dial 220 stations, full dial 16 stations)
	Other supported functions	Timer transmission, address book, real time clock, auto redial, reduce/split, smoothing

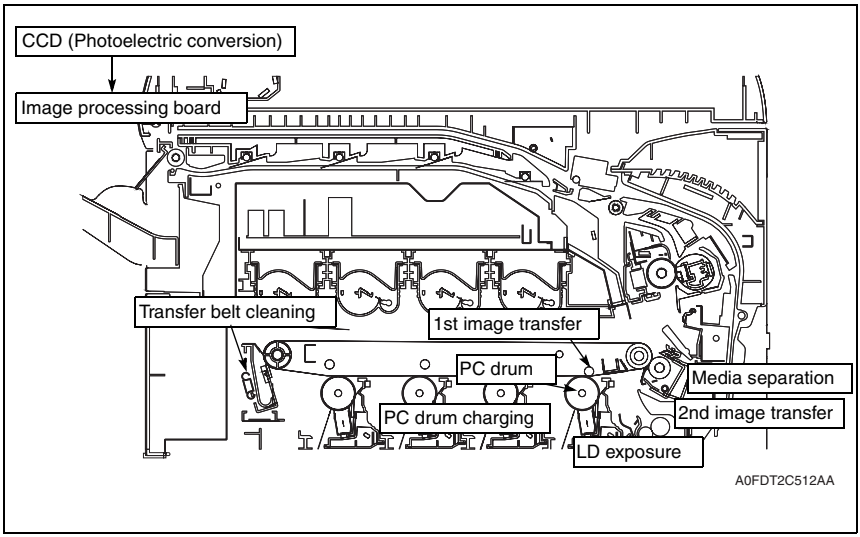
3. Section configuration



4. Media path



5. Image creation process



[1]	CCD (Photoelectric conversion)	• Light reflected off the surface of the original is converted to a corresponding electric signal by CCD and the resultant electric signal is sent to the image processing board.
[2]	Image processing board	• The intensity of the laser light is controlled based on the image signal transmitted to this board.
[4]	PC drum	• The image of the original projected onto the surface of the PC drum is changed to a corresponding electrostatic latent image.
[5]	PC drum charging	• Apply DC (-) charge to the photo conductor.
[6]	LD exposure	• The surface of the PC drum is irradiated with laser light, and an electrostatic latent image is thereby formed.
[7]	Developing	• The toner, agitated and negatively charged in the toner chamber, is attracted onto the electrostatic latent image formed on the surface of the PC drum. It is thereby changed to a visible, developed image.
[8]	1st image transfer	• A DC positive voltage is applied to the backside of the transfer belt, thereby allowing the visible, developed image on the surface of each of the PC drums (Y, M, C and K) to be transferred onto the transfer belt.
[9]	2nd image transfer	• A DC positive voltage is applied to the backside of the media, thereby allowing the visible, developed image on the surface of the transfer belt to be transferred onto the media.
[10]	Media separation	• The media, which has undergone the 2nd image transfer process, is neutralized so that it can be properly separated from the transfer belt.
[11]	Transfer belt cleaning	• The residual toner left on the surface of the transfer belt is scraped off.
[12]	PC drum cleaning	• The residual toner left on the surface of the PC drum is scraped off.

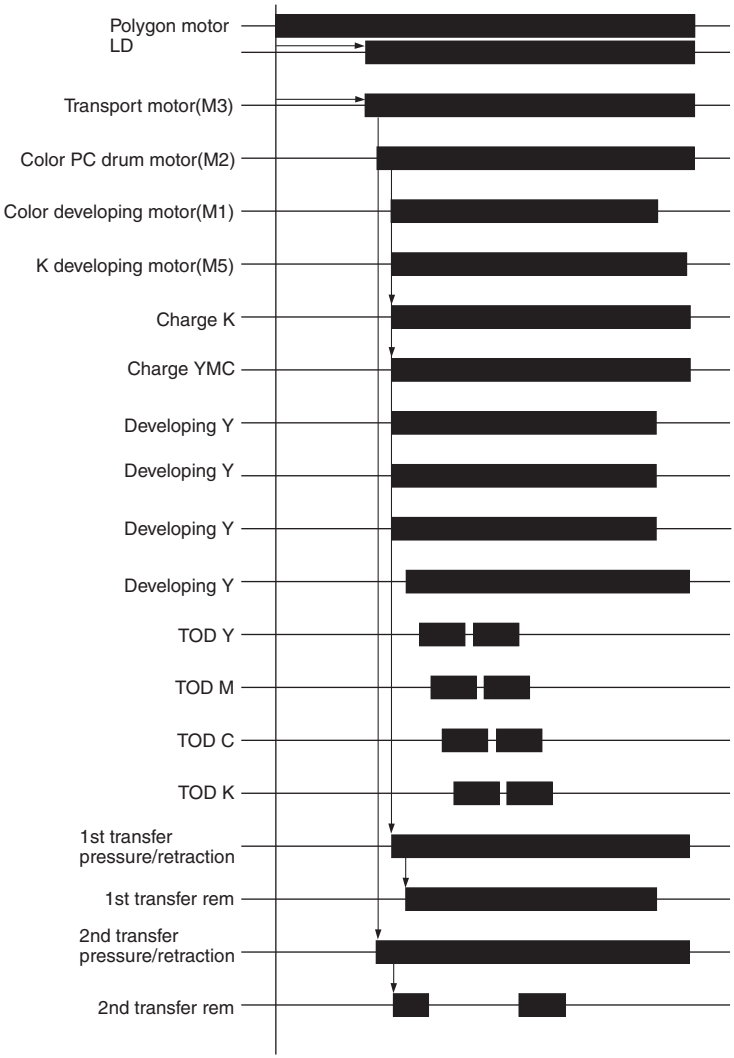
Blank Page

Composition/Operation

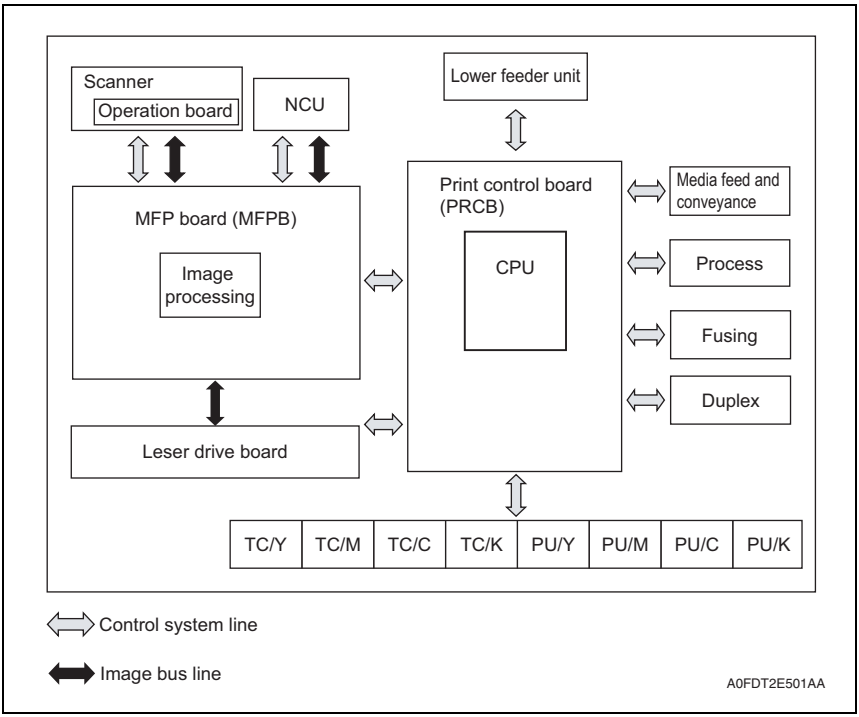
6. Overall Composition

6.1 Timing chart at main body power on

Conditions: A4S plain paper



6.2 Control block diagram



7. Scanner section

7.1 Composition

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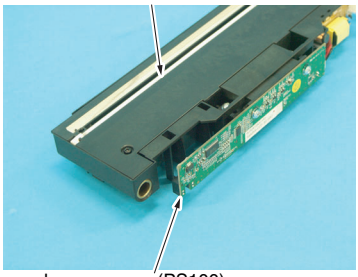

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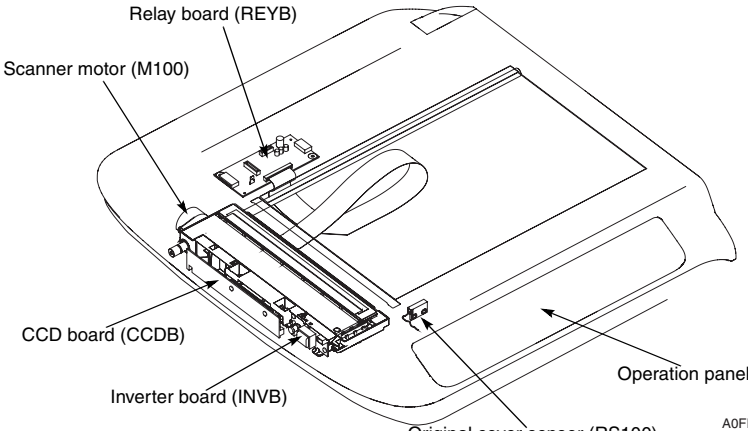

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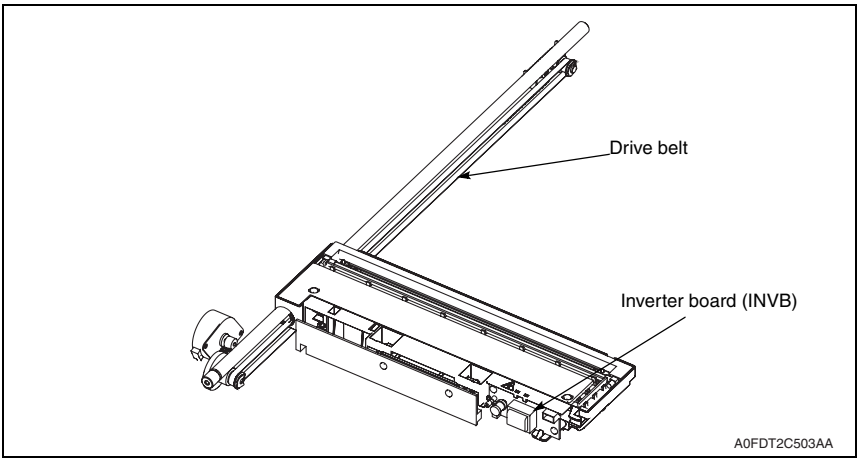
7.2 Drive



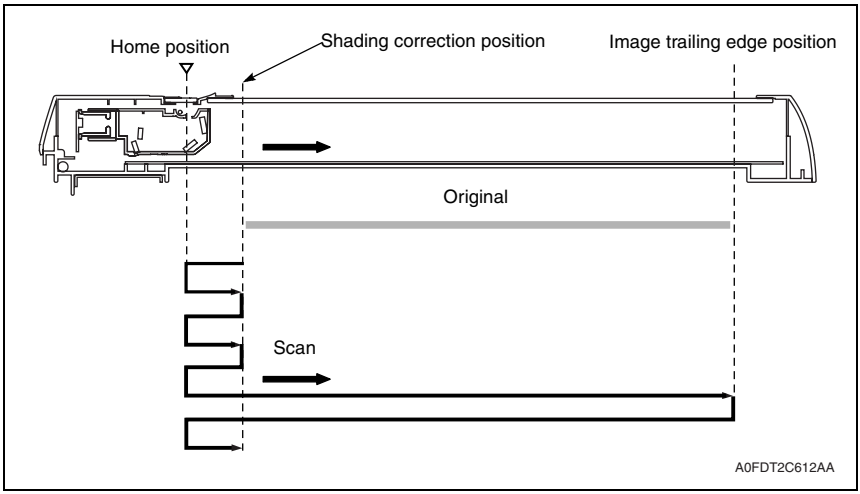
7.3 Operation

7.3.1 When the Start key is pressed

A. Original reading mode

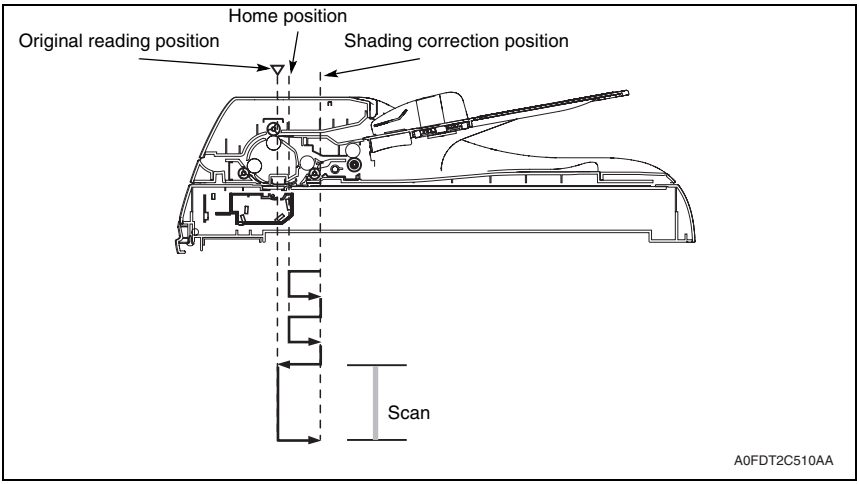
(1) Original cover mode

1. When the start key is pressed, the scanner unit moves to the home position (at which the scanner home sensor is activated).
2. The scanner unit moves to the shading correction position.
3. The operations of steps 1 and 2 are repeated twice.
4. During the third operation, the scanner unit moves from the shading correction position to the leading edge position of the image and starts reading the image of the original.
5. The scanner unit completes its image reading sequence at the trailing edge position of the image.
6. After having read the image, the scanner unit moves to the home position and to the shading correction position.



(2) DF mode

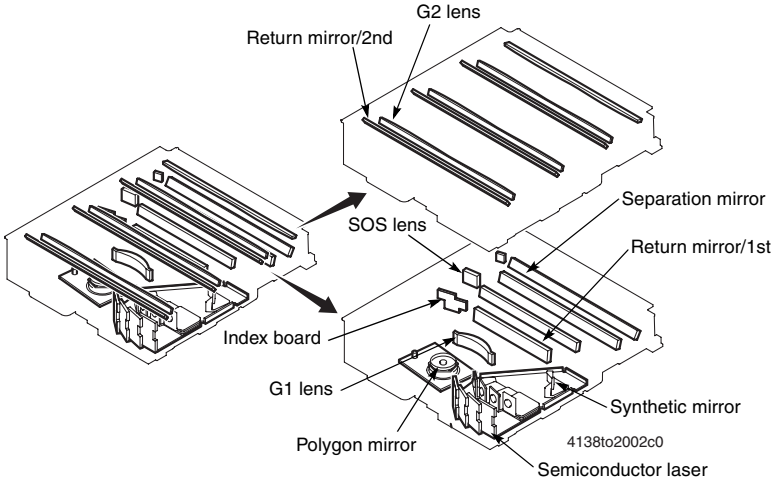
1. When the start key is pressed, the scanner unit moves to the home position.
2. The scanner unit moves to the shading correction position.
3. The operations of steps 1 and 2 are repeated twice.
4. During the third operation, the scanner unit moves from the shading correction position to the original reading position.
5. The scanner unit reads the image of the original fed from the auto document feeder at the original reading position.
6. After having read the image, the scanner unit moves to the shading correction position.



8. Write section

8.1 Composition

4138to2001c0



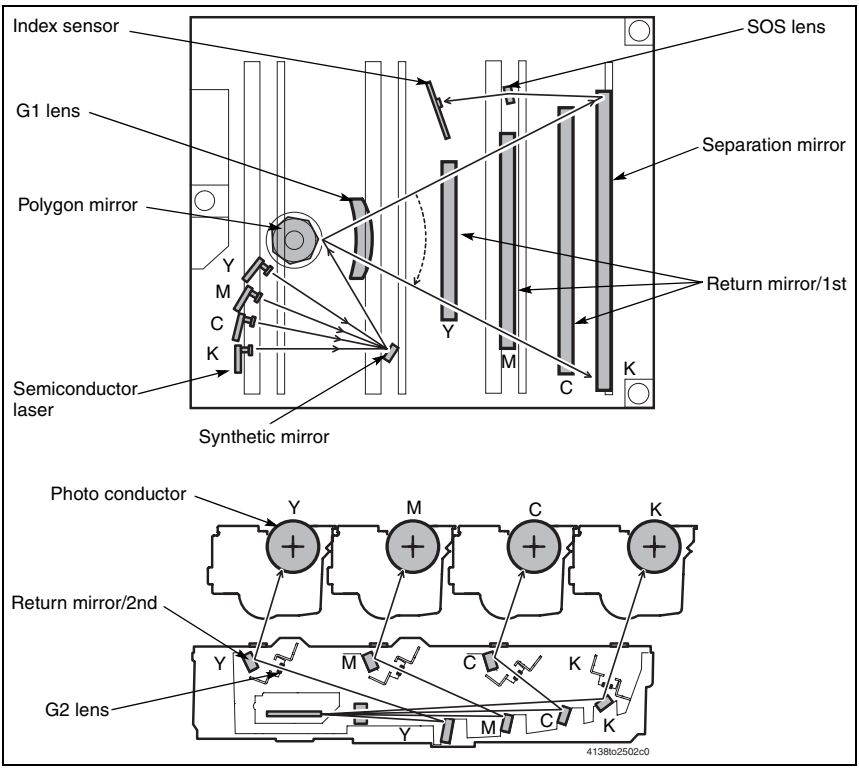
8.2 Operation

8.2.1 Overview

- Four semiconductor lasers provided, one for each of the four different colors. A single polygon motor is used to make a scan motion.
- Each photo conductor is irradiated with a laser light so that an electrostatic latent image is formed on it.

8.2.2 Laser exposure process

1. The laser light emitted by each of the semiconductor laser/Y, M, C, and K is reflected onto the polygon mirror via the synthetic mirror.
2. Since the angle of incidence for each color of laser light varies, the laser light reflected by the polygon mirror is reflected at a different angle for each color.
3. The condensing angle of each color of laser light is corrected by the G1 lens before reaching each return mirror.
4. The K laser light is condensed on the surface of the photo conductor through the separation mirror and G2 lens.
5. The Y, M, or C laser light is condensed on the photo conductor through the separation mirror, G2 lens, and return mirror.



8.2.3 Laser emission timing

- When a ready signal is detected after the lapse of a given period of time after the print cycle has been started, a laser ON signal is output from the MFP board.
- The laser ON signal triggers the firing of each laser light, which illuminates the index board via the polygon mirror, G1 lens, separation mirror (K), and SOS lens. This generates an SOS signal.
- This SOS (Start of Scan) signal unifies the timing at which the laser lights are irradiated for each main scan line.
- The SOS signal is generated only from the K laser light. For the other colors, the emission timing is determined with reference to K.

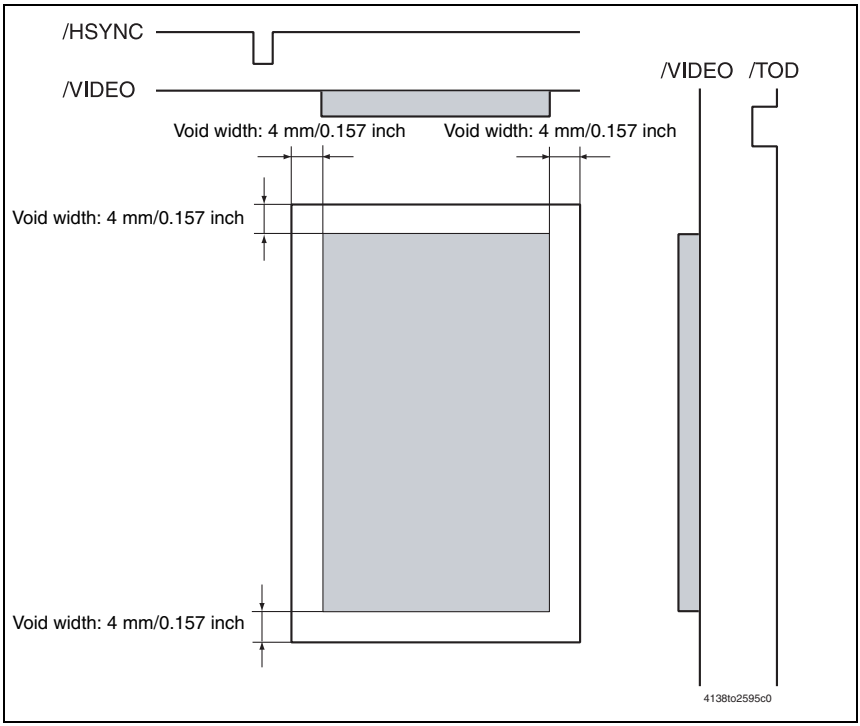
8.2.4 Laser emission area

A. Main scan direction (FD)

- The print start position in the FD direction is determined by the FD print start signal (HSYNC) that is output from the MFP board and the width of the media.
- The laser emission area is determined by the media size. However, there is a 4 mm/0.157 inch wide void area on both the both edges of the media.

B. Sub scan direction (CD)

- The print start position in the CD direction is determined by the CD print start signal (TOD) that is output from the MFP board and the length of the media. However, there is a 4 mm/0.157 inch wide void area on both edges of the media.
- The laser emission area is determined by the media size. However, there is a 4 mm/0.157 inch wide void area on both the leading and trailing edges of the media.



8.2.5 Laser light intensity control

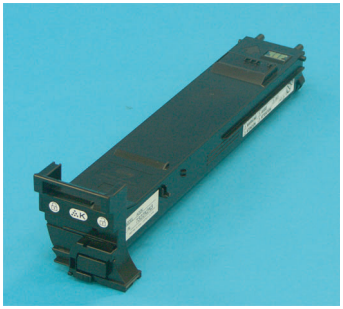
- The laser light intensity control corrects the target level of fluctuations in fine line reproduction and reverse image (white on black) reproduction that occur due to variations in photo conductor electrostatic characteristics, developing characteristics, and transfer characteristics (part-to-part variations, environment, durability).
- It is controlled integrally with other control items by the image stabilization control.
- The laser light intensity control is performed when there is a request made for execution of an image stabilization sequence.

8.2.6 Registration correction control

- In a tandem engine that has an image forming process for each color of toner, incorrect color registration tends to occur due to variations in parts of the main body used for regulating the drawing positions. The registration correction control automatically detects and corrects this incorrect color registration.
- It is controlled integrally with other control items by the image stabilization control.
- The registration correction control is performed when there is a request made for execution of image stabilization sequence.

9. Toner supply section

9.1 Composition



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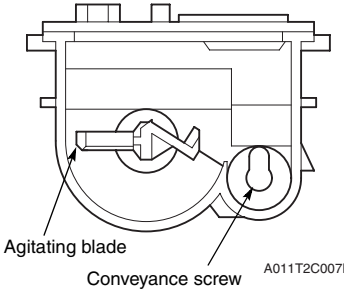

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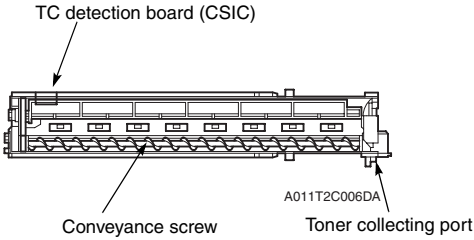

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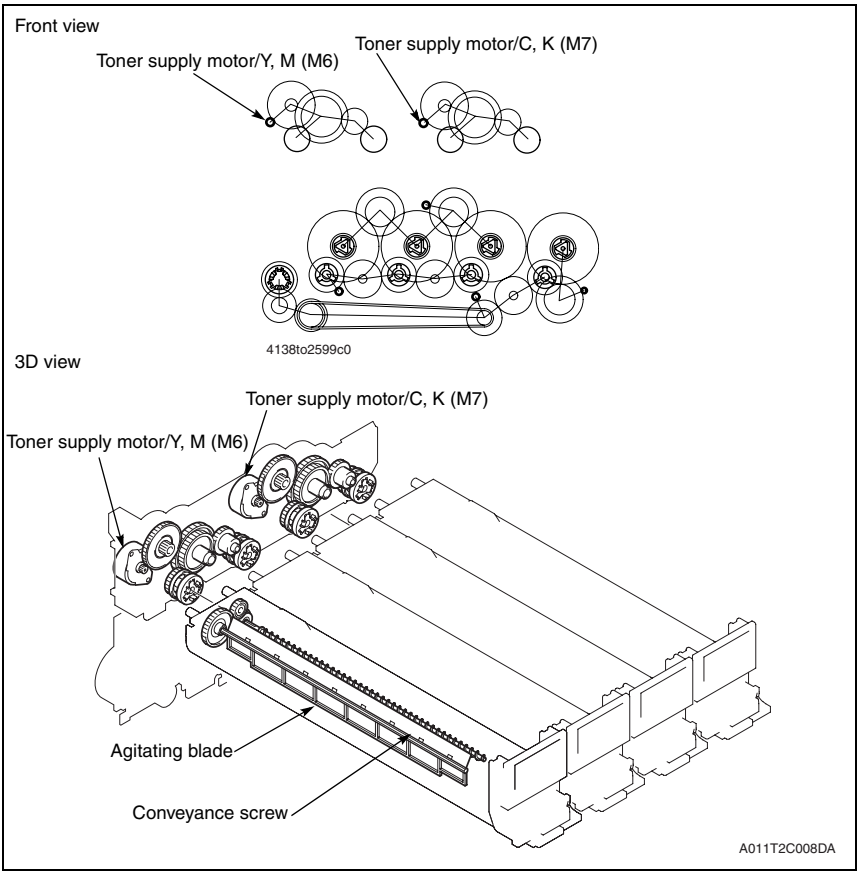
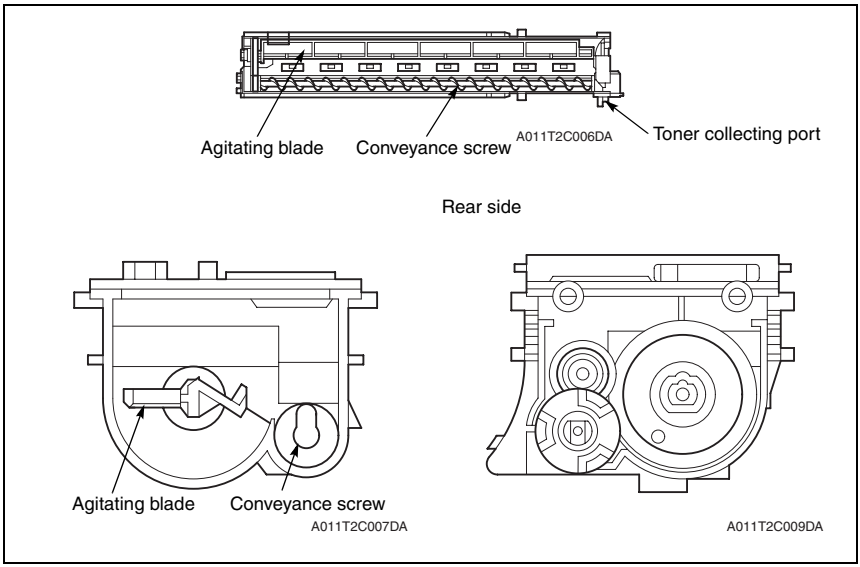
9.2 Drive


Front view
Toner supply motor/Y, M (M6)
Toner supply motor/C, K (M7)
4138to2599c0
3D view
Toner supply motor/C, K (M7)
Toner supply motor/Y, M (M6)
Agitating blade
Conveyance screw
A011T2C008DA

9.3 Operation

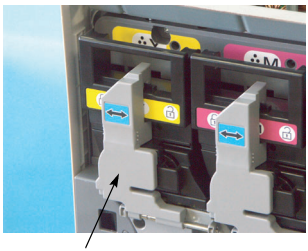
9.3.1 Toner conveying mechanism

- The toner supply motor is turned either forward or backward to drive the agitating blade and the conveyance screw.
- The agitating blade provided in the toner cartridge agitates and conveys toner to the conveyance screw.
- The toner conveyed by the agitating blade is conveyed to the toner collecting port sitting on the front side of the main body by the conveyance screw.



9.3.2 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the toner cartridge is removed from the main body.
- After installing the toner cartridge into the main body, placing the print unit release lever in its locked position opens the shutter of the toner collecting port. Then toner can be conveyed to the main body.
- Moving the print unit release lever to the right or left accompanies the synchronizing movement of the slider. This makes the gear connected to the shutter rotated and then makes the shutter opened or closed.
- To prevent the front door from getting closed while the shutter is open, the preventive mechanism works in the way that the front door cannot be closed by interfering with the release lever until the release lever is placed in the locked position (to the left in the picture).



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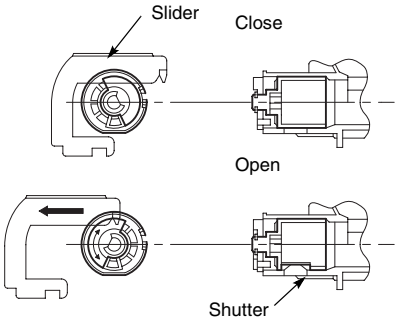

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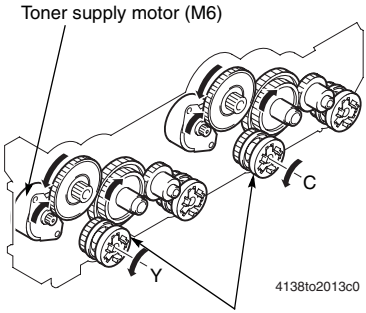
9.3.3 Toner replenishing mechanism

- The toner supply motor is energized according to the condition of the toner level sensor for each color of toner. Toner is then supplied from the toner cartridge to the print unit as necessary.
- A single toner supply motor is turned either forward or backward to accomplish supply of toner of two different colors (one motor is for Y and M, and the other for C and K). That is, M (K) toner cannot be supplied while Y (C) toner is being supplied.
- Toner is supplied only while the print unit is being driven. This is because of the following reason: if toner is supplied from the toner cartridge while the print unit remains stationary, toner stagnates at the print unit.

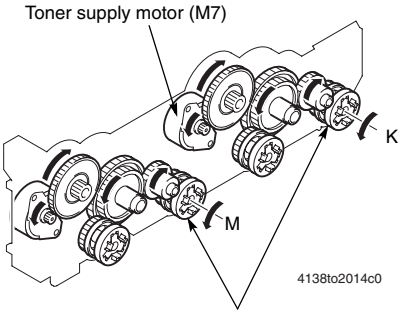
Toner supply motor	Direction of rotation (as viewed from above of motor shaft)	Toner supply (Agitating blade/conveyance screw)			
		Y	M	C	K
/Y, /M (M6)	Forward (clockwise)	Turned	Stationary	Stationary	Stationary
	Backward (counterclockwise)	Stationary	Turned	Stationary	Stationary
/C, /K (M7)	Forward (clockwise)	Stationary	Stationary	Turned	Stationary
	Backward (counterclockwise)	Stationary	Stationary	Stationary	Turned

When the motor turns forward



Y/C one-way clutch turns.

When the motor turns backward



M/K one-way clutch turns.

9.3.4 Toner level detection

- The toner level is determined by the accumulated time of rotation of the toner supply motor.
- The toner level can be checked through MENU/PRINT MENU/STATISTICS PAGE.

9.3.5 Toner near-empty condition detection

- The cumulative period of time through which the toner supply motor is energized is detected as the basis for determining whether there is a toner near-empty condition.
- The main body is designed to indicate a toner near-empty condition when the toner level remaining in the toner cartridge becomes approx. 40 percent.

Toner cartridge	Toner remaining level (Targeted percent)	Pages that can be printed after toner near-empty detection (Targeted number of pages) *
Quantity equivalent to 3,000 printed	40%	Approx. 1,200 sheets
Quantity equivalent to 4,000 printed		Approx. 1,600 sheets
Quantity equivalent to 8,000 printed		Approx. 3,200 sheets

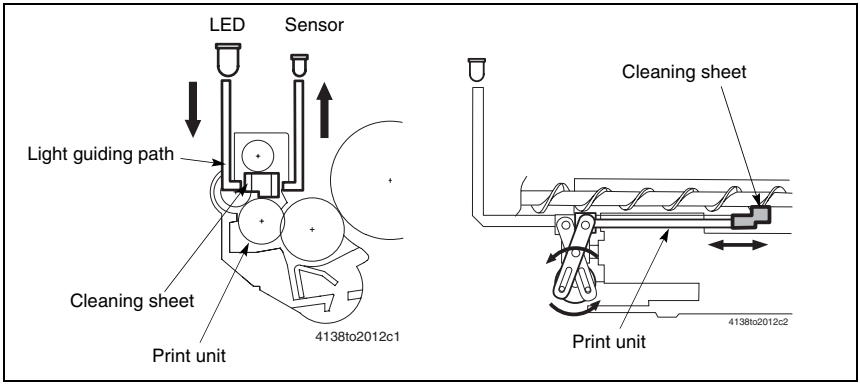
* for a standard original of a 5% coverage rate

- A toner near-empty condition is reset when a new toner cartridge is detected.

9.3.6 Toner empty condition detection

A. Toner empty condition detection mechanism

- The print unit has a toner empty condition detecting mechanism.
  Based on the amount of toner conveyed from the toner cartridge to the print unit, a toner empty condition is detected.
- A toner level in the print unit is detected by the LED and toner level sensor mounted on the toner level sensor board provided in the main body.
- Light emitted from the LED travels through the light guiding path and is guided into the print unit.
- The toner level sensor detects the intensity of the transmitted light guided through the light guiding path from the inside of the toner cartridge. The toner level is thereby estimated.
- To ensure correct detection of the intensity of transmitted light by the toner level sensor, a cleaning sheet is provided that cleans the window in the light guiding path periodically.



9.3.7 Toner empty condition detection control

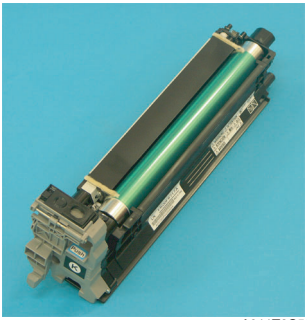
- A sequence is started for detecting a toner empty condition when a toner near-empty condition is detected. (In starter cartridges shipped with a main body, the toner empty detection control always functions.)
- The main body determines that there is a toner empty condition when the toner level sensor output value remains below a predetermined value and if the following event is detected a predetermined number of consecutive times: the output value of the toner level sensor remains a predetermined value or lower for more than a predetermined period of time.
- The consecutive detection count is retained even when power is turned OFF.
- A toner empty condition is reset when a new toner cartridge is detected.

9.3.8 Toner cartridge life control

- Each toner cartridge is provided with a TC detection board that detects state of a toner cartridge placement, a new TC, a toner near-empty condition, and a toner empty condition.

10. Print unit section (overall composition)

10.1 Composition



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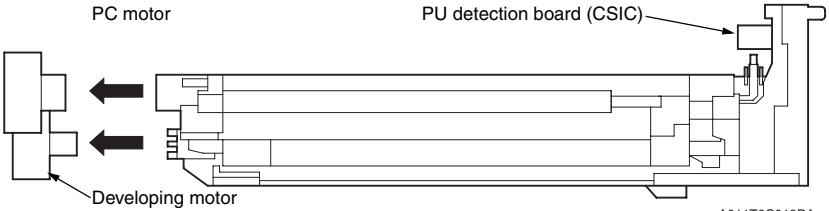

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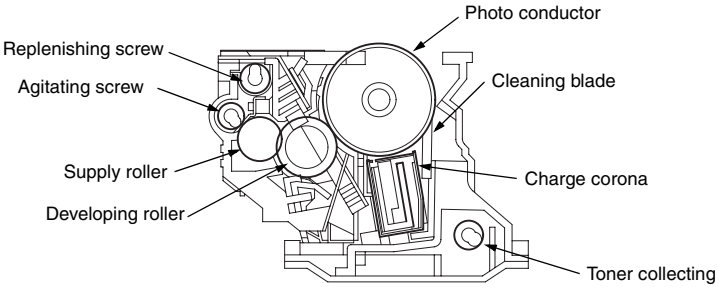

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10.2 Operation

10.2.1 Print unit life detection

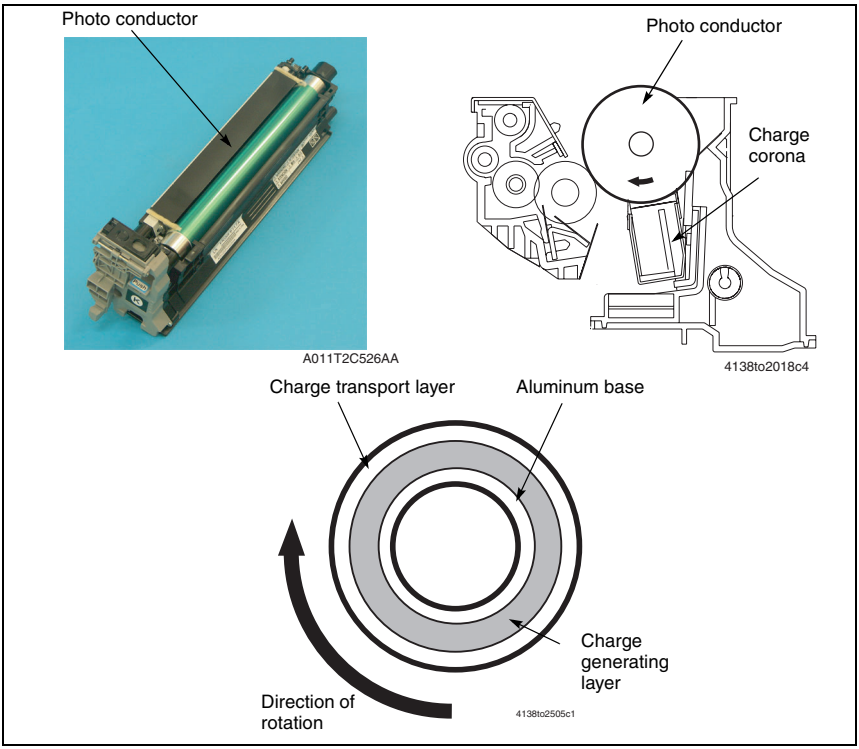
- Based on the photo conductor driving time, the cartridge life is determined.
- When the photo conductor driving time reaches its near life, the near life warning message appears.
- When the photo conductor driving time reaches its life time, the life warning message appears.
- If the photo conductor runs more than its life, a life end warning message appears. When the warning message appears, you cannot print.
- The life end message can be reset when the print unit is replaced.

10.2.2 Print unit life control

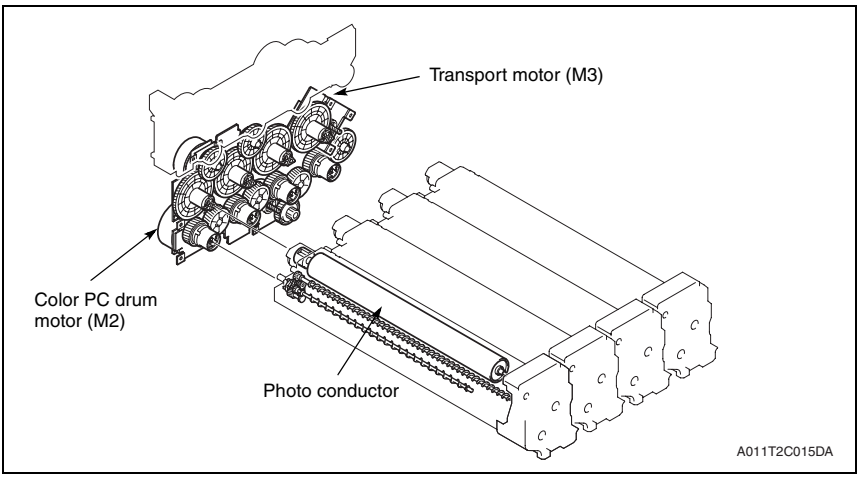
- Each print unit is provided with a PU detection board that detects state of a toner cartridge placement, a new PU, a print unit life.
- The main body attempts to perform a detection sequence when the front door is closed.
- When a cartridge is detected as a new one, an image stabilization sequence starts.

11. Print unit section (photo conductor)

11.1 Composition



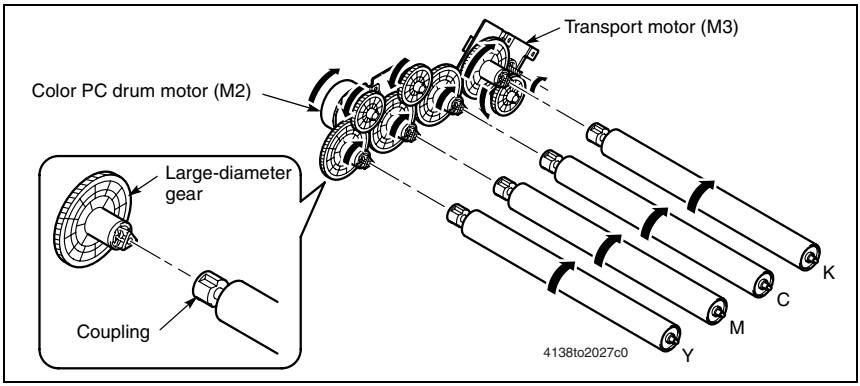
11.2 Drive



11.3 Operation

11.3.1 Photo conductor drive mechanism

- Motors are used for the drive mechanism independently of the developing system to suppress incorrect color registration and uneven pitch.
- To stop the drive for the color toner cartridges in the monochrome mode, different motors are used to drive the color photo conductors and black photo conductor.
- The color PC drum motor drives the photo conductor/Y, M, and C, while the Transport motor drives the photo conductor/K.
- In addition to the photo conductor/K, the Transport motor also drives the transfer system, media feed system, and synchronizing drive system.
- Gears having a large diameter are used to enhance rotating accuracy of the photo conductors.
- The use of gears having a large diameter provides a large number of gear teeth, which suppresses uneven pitch and eccentricity.
- Drive is transmitted to each of the photo conductors when the coupling on the drive end is engaged with that on the driven end.



11.3.2 Photo conductor post-exposure control

- The entire surface of the photo conductor is exposed to light before the photo conductor stops rotating during the stop sequence or color change sequence (from the color print to monochrome print) after a print cycle.
- Ozone stagnant in areas near the charge corona unit is adsorbed on the surface of the photo conductor. This reduces sensitivity of the photo conductor, causing white bands to occur in the image.
- To prevent this image failure from occurring, the entire surface of the photo conductor is exposed to light and thus neutralized. This effectively prevents the surface of the photo conductor from absorbing ozone.

11.3.3 Photo conductor total exposure control upon recovery

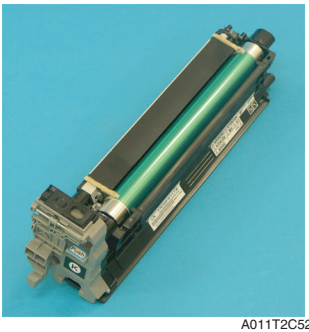
- If the “Photo conductor post-exposure control” described above is not correctly done, the entire surface of the photo conductor is exposed to light, thereby preventing ozone from being adsorbed on the surface of the photo conductor.
- If the “Photo conductor post-exposure control” is not performed due to a media misfeed or malfunction, the entire surface of the photo conductor is exposed to light at the same time that the “2nd transfer roller cleaning control” is performed during the recovery procedure from the media misfeed or malfunction.

11.3.4 Photo conductor small amount rotation control

- Ozone stagnant in areas near the charge corona unit reduces sensitivity of the photo conductors, causing white bands to occur in the image.
- To prevent this image problem, the photo conductor is turned so as to allow its surface facing the charge corona unit to deviate, thereby preventing the surface sensitivity from being reduced.

12. Print unit section (charge corona)

12.1 Composition



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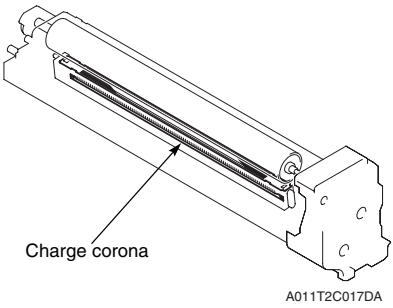

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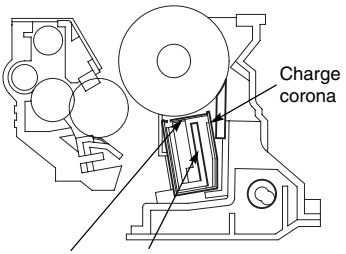

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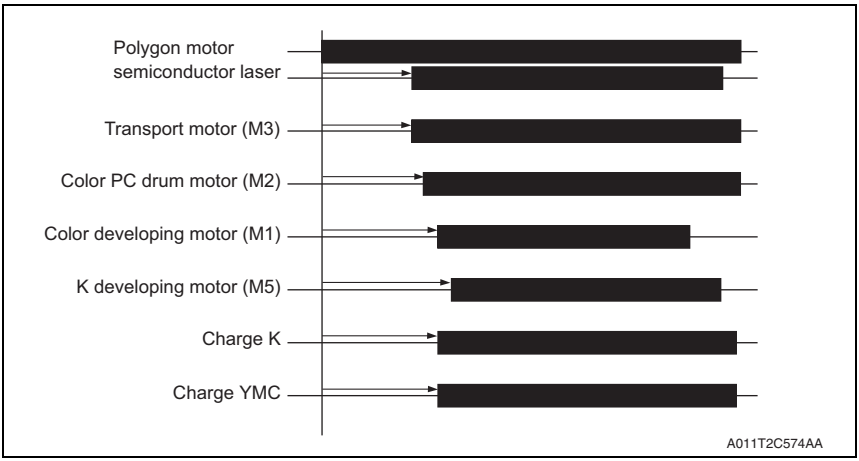
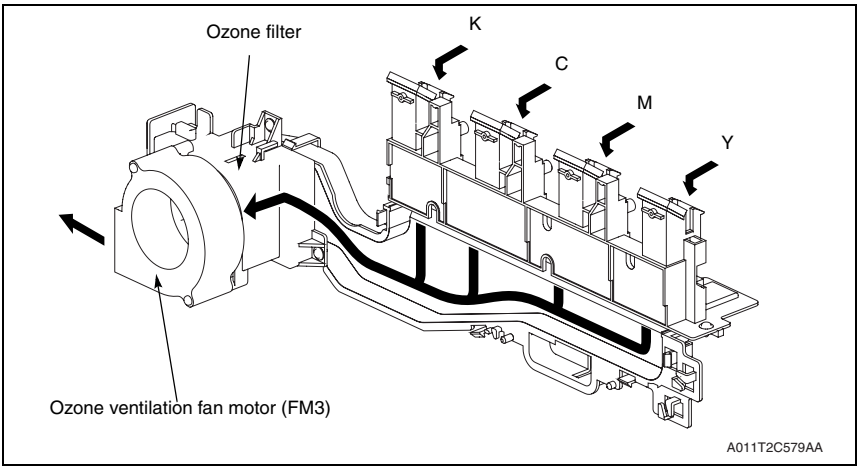
12.2 Operation

12.2.1 Charge corona unit ON/OFF control



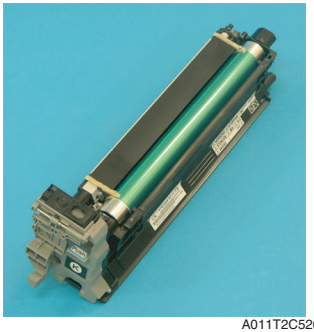
12.2.2 Ozone ventilation mechanism

- Ozone stagnant in areas near the charge corona unit reduces sensitivity of the photo conductor, causing white bands to occur in the image.
- The ozone filter is used to remove ozone produced by the charge corona unit, thereby preventing sensitivity of the photo conductor surface from being degraded.
- Outside air is drawn in through the opening provided at the front end of the charge corona unit and is discharged together with ozone through the opening provided in the rear.
- The ozone ventilation fan motor located in the rear of the main body draws air to allow the discharged ozone to be removed by the ozone filter.



13. Print unit section (developing)

13.1 Composition



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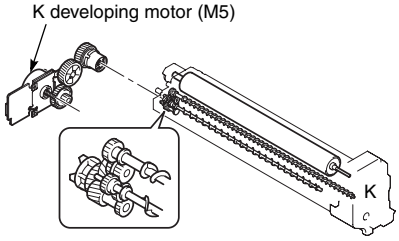

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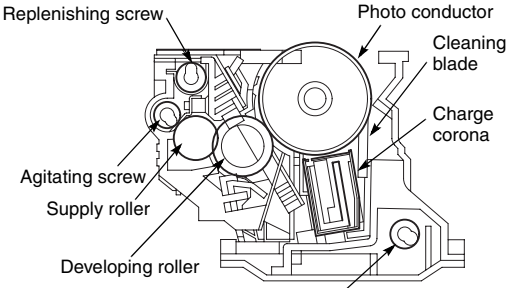

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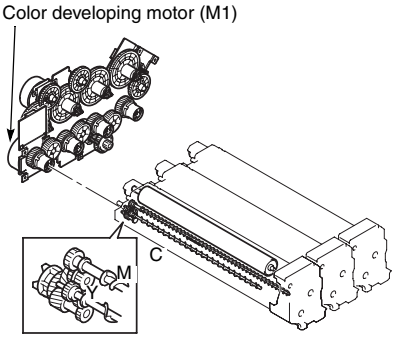

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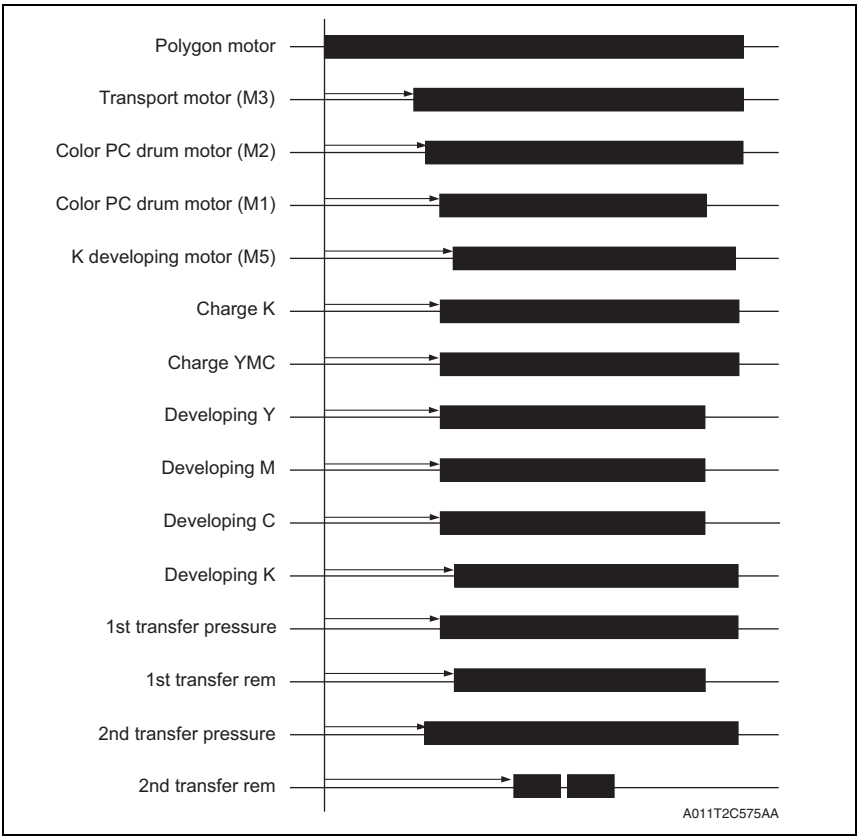
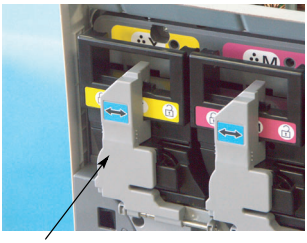
13.2 Operation

13.2.1 Developing drive control



13.2.2 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the print unit is removed from the main body.
- After installing the print unit and the toner cartridges into the main body, locking the print unit release lever opens the collecting port shutter. Then toner can be replenished from the toner cartridges.
- Moving the print unit release lever to the right or left accompanies the synchronizing movement of the slider. This makes the shutter opened or closed.
- To prevent the front door from getting closed while the shutter is open, the preventive mechanism works in the way that the front door cannot be closed by interfering with the release lever until the release lever is placed in the locked position (to the left in the picture).



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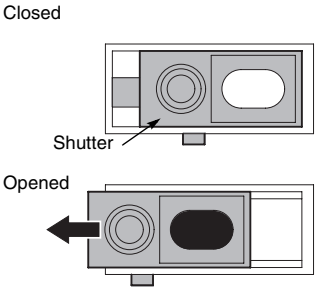

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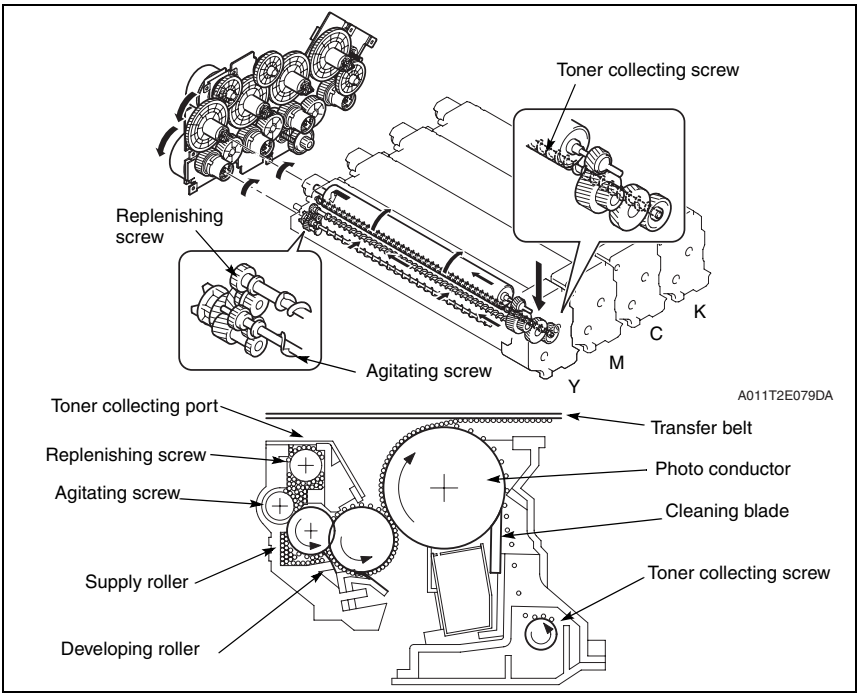
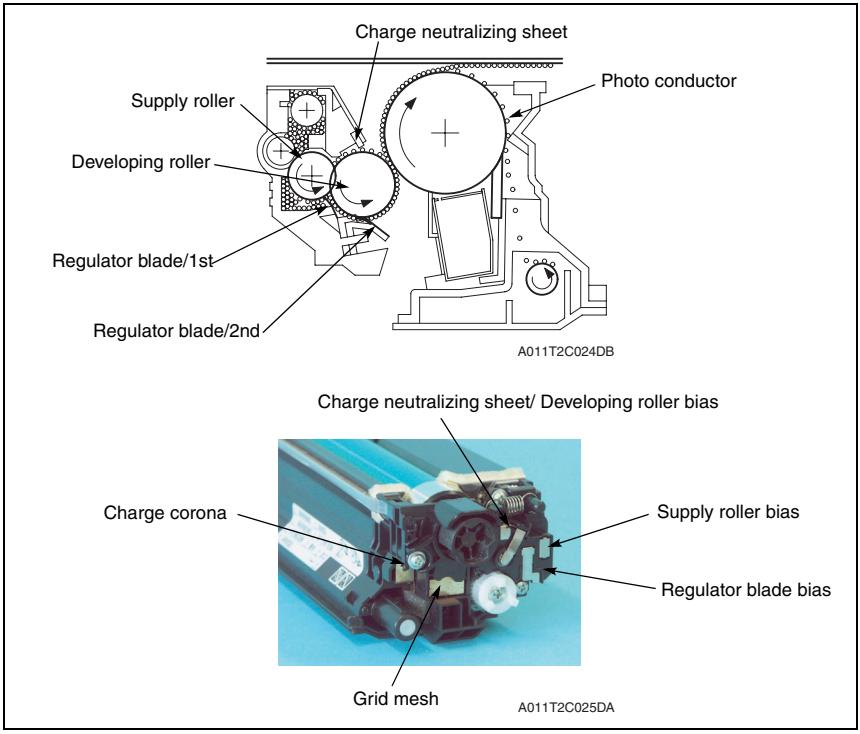
13.2.3 Toner flow

1. Toner stored in the toner cartridge is agitated by the agitating blade and conveyed onto the front side of the toner cartridge by the conveyance screw.
2. Toner conveyed onto the front side of the toner cartridge is conveyed through the toner collecting port and then conveyed to the print unit collecting port.
3. The toner conveyed to the collecting port is conveyed into the toner chamber by the replenishing screw.
4. The toner level detection system provided on the front side of the developing unit (the sensor is mounted on the main body side) detects, at this time, the level of toner still available for use in the toner chamber.
5. The toner conveyed to the toner chamber is agitated (charged) by the replenishing screw and agitating screw.
6. Toner conveyed onto the rear side of the toner chamber is fed to the supply roller.
7. Toner fed to the supply roller is conveyed onto the developing roller.
   At this time, the regulator blade/1st and /2nd regulate the height of toner on the surface of the developing roller.
8. Toner on the developing roller is fed to the electrostatic latent image formed on the surface of the photo conductor.
9. Toner left on the developing roller is neutralized and returned to the supply roller.
10. The toner on the surface of the photo conductor is transferred onto the transfer belt.
11. Toner left on the surface of the photo conductor is scraped off by the cleaning blade.
12. The toner scraped off by the cleaning blade is conveyed to the waste toner conveyance section by the toner collecting screw.
13. The toner conveyed by the toner collecting screw is conveyed and stored as waste toner in the waste toner bottle.



13.2.4 Developing system

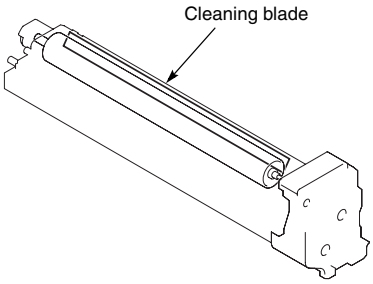
- Two types of developing systems are used, a non-contact developing system and an alternating current application system.
  1. A negative charge (supply bias voltage Vr) is applied the supply roller to regulate the amount of toner sticking to the developing roller.
  2. A negative charge (blade bias voltage Vb1) is applied to the regulator blade/1st to negatively charge the toner and form a thin layer of toner.
  3. Toner on the surface of the developing roller is evened out by the regulator blade/2nd.
  4. During development, DC + AC developing bias voltage (Vb) is applied to developing roller. The AC component of the developing bias voltage is applied only during development. At any time other than the development, only the DC component of the developing bias voltage is applied.
  5. Toner sticks to the photo conductor when the AC component of the developing bias voltage (Vpp) is negative. The voltage and time length of the negative component (Vpp) determines the image density.
  6. A negative charge (charge neutralizing bias voltage: same potential as the developing bias) is applied to the charge neutralizing sheet to neutralize any toner left on the surface of the developing roller. The neutralized toner is returned to the supply roller.



13.2.5 Cleaning mechanism

A. Cleaning operation

1. The cleaning blade is pressed against the surface of the photo conductor to remove toner left off the surface (fixed blade system).
2. The toner, which has been scraped off by the cleaning blade, is conveyed by the toner collecting screw and collected in the waste toner transport section.



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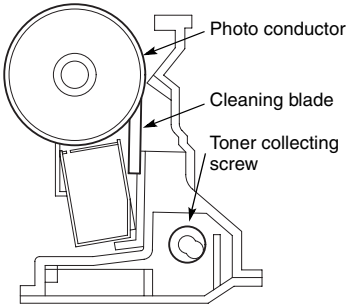

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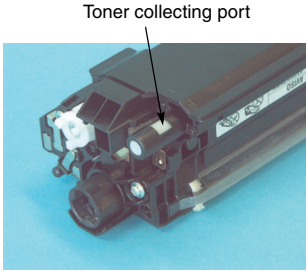
13.2.6 Toner collecting port shutter mechanism

- The toner collecting port is equipped with a shutter mechanism that prevents toner from being spilled out when the print unit is removed from the main body.
- When the print unit is installed into the main body, the shutter of the toner collecting port opens and toner can be discharged from the print unit.



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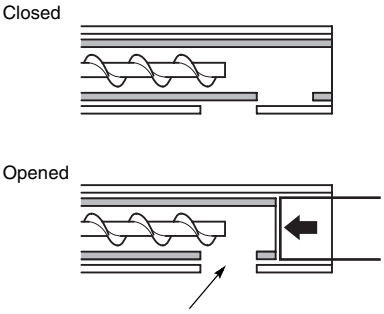

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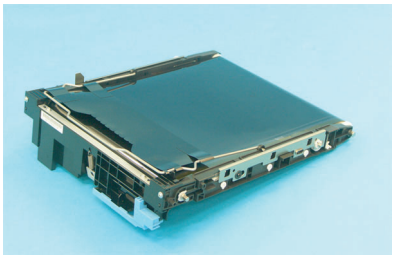
14. Transfer section (1st transfer)

14.1 Composition



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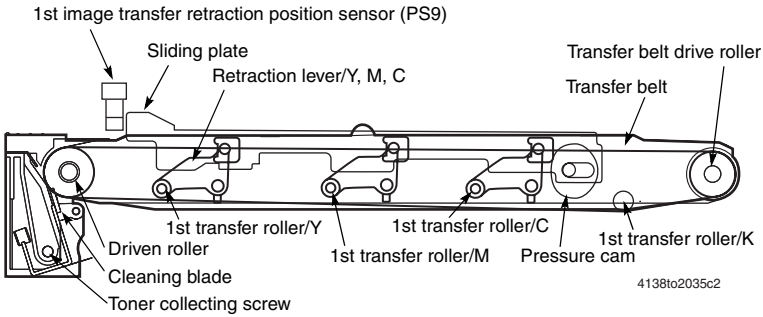
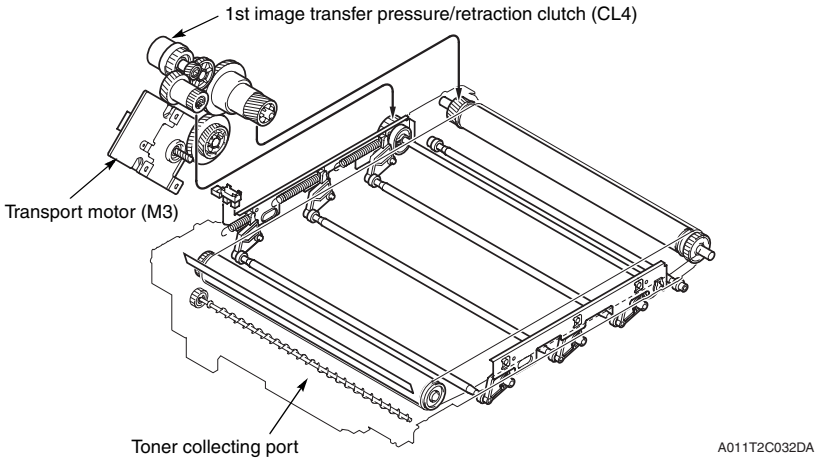
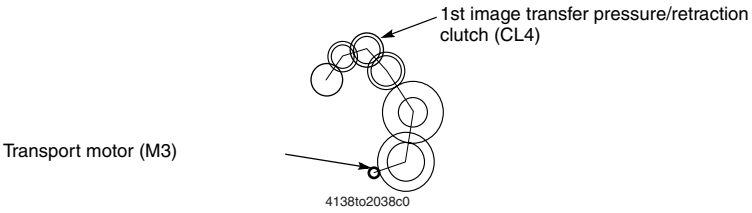
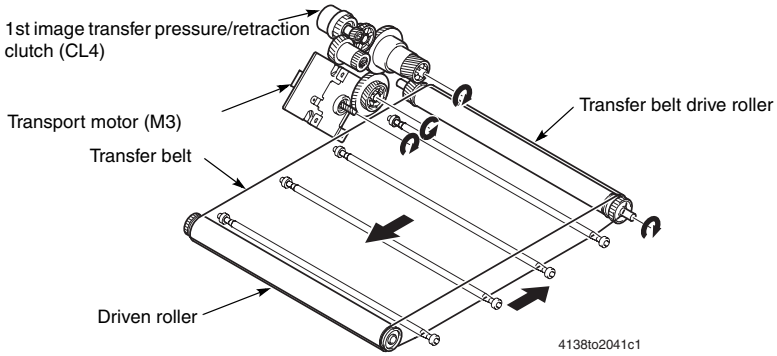




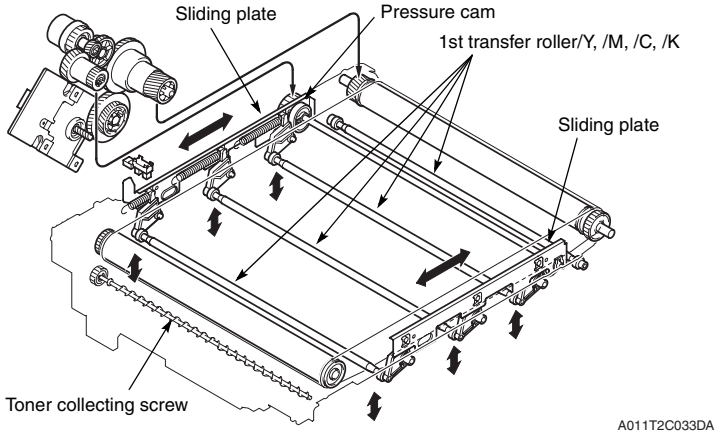
14.2 Drive



Mechanism for driving the belt



Mechanism for driving the pressure/retraction motion



14.3 Operation

14.3.1 1st transfer output control

- To transfer the toner image from the photo conductor to the transfer belt, the transfer voltage is applied to the 1st transfer roller.
- A charge of the same potential is applied to each of the 1st transfer rollers.
- The transfer voltage is applied after the 1st transfer roller/Y, M, C is pressed against the transfer belt for color mode.
- The transfer output is turned OFF after the last image moves past the 2nd transfer section.

14.3.2 1st transfer roller pressure/retraction control

- To extend the service life of the photo conductor/Y, M, C, the pressure position of the 1st transfer roller is changed between the monochrome mode and the color mode.
  The 1st transfer roller/K is not provided with a retraction mechanism; the transfer belt is pressed against the photo conductor/K at all times.
- The Transport motor provides the drive for pressure/retraction operation of the 1st transfer roller/Y, M, C.

A. Monochrome mode

- The 1st transfer roller/Y, M, C is moved inward the unit (for retraction) and the photo conductor/Y, M, C is stopped. The transfer roller is moved (retracted) and the photo conductor is stopped also in the ordinary standby state.

B. Color mode

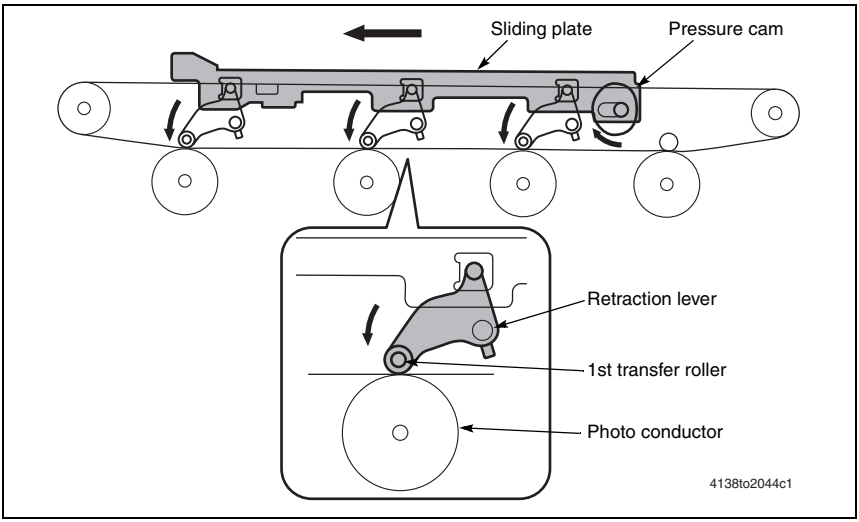
- During the 1st transfer in the color mode, the 1st transfer roller/Y, M, C is moved toward the photo conductor (pressed) so that transfer belt is pressed against the photo conductor.

C. Others

- The transfer roller is moved (retracted) and the photo conductor is stopped in the ordinary standby state.

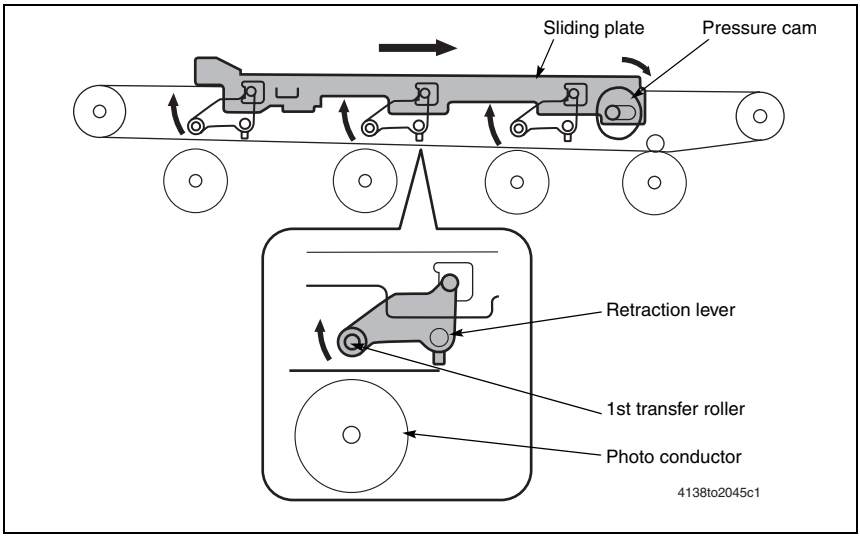
14.3.3 1st transfer roller pressure operation

1. Rotation of the Transport motor is transmitted by a gear train to the 1st image transfer pressure/retraction clutch.
2. Rotation of the 1st image transfer pressure/retraction clutch turns the pressure cam, which moves the sliding plate.
3. As the sliding plate moves, the retraction lever turns.
4. As the retraction lever turns, the 1st transfer roller is pressed against the transfer belt.



14.3.4 1st transfer roller retraction operation

1. Rotation of the Transport motor is transmitted by a gear train to the 1st image transfer pressure/retraction clutch.
2. Rotation of the 1st image transfer pressure/retraction clutch turns the pressure cam, which moves the sliding plate.
3. As the sliding plate moves, the retraction lever turns.
4. As the retraction lever turns, the 1st transfer roller is retracted from the transfer belt.



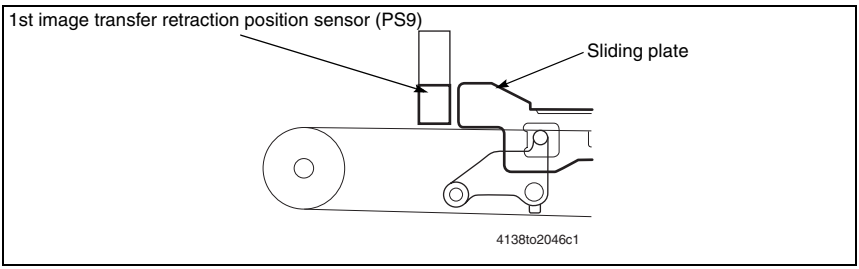
14.3.5 1st transfer roller pressure/retraction position control

A. Pressure position control

- The pressure and retraction operation of the 1st transfer roller is controlled as the 1st image transfer retraction position sensor detects the movement of the sliding plate.
  1. The 1st image transfer pressure/retraction clutch is energized.
  2. The sliding plate is moved to press the 1st transfer rollers up against the transfer belt, which blocks the 1st image transfer retraction position sensor.
  3. After the lapse of a predetermined period of time after the 1st image transfer retraction position sensor has been blocked, the 1st image transfer pressure/retraction clutch is de-energized.

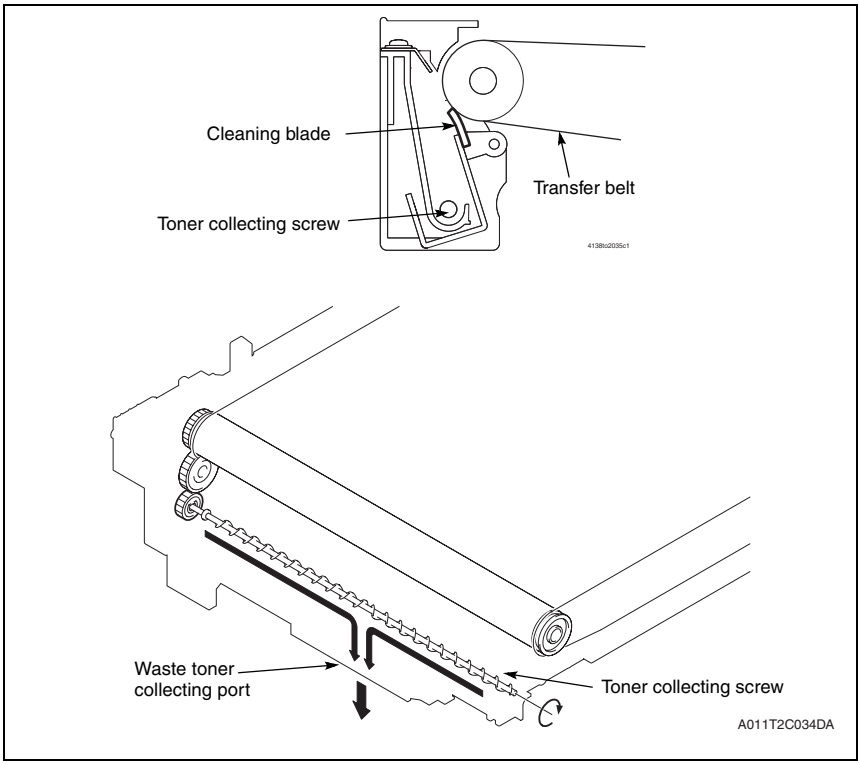
B. Retraction position control

- The pressure and retraction operation of the 1st transfer roller is controlled as the 1st image transfer retraction position sensor detects the movement of the sliding plate.
  1. The 1st image transfer pressure/retraction clutch is energized.
  2. The sliding plate is moved to retract the 1st transfer rollers from the transfer belt. As a result, the 1st image transfer retraction position sensor, which has been blocked, is now unblocked.
  3. After the lapse of a predetermined period of time after the 1st image transfer retraction position sensor has been unblocked, the 1st image transfer pressure/retraction clutch is de-energized.



14.3.6 Transfer belt cleaning mechanism

- To scrape residual toner off the surface of the transfer belt, the transfer belt is provided with a cleaning blade.
- The cleaning blade is in pressed contact with the transfer belt at all times. That is, it cleans the surface of the transfer belt as long as the belt turns.
- The toner scraped off by the cleaning blade is collected to the middle of the transfer belt by the toner collecting screw.
- The collected waste toner is conveyed through the waste toner collecting port located at the middle of the transfer belt unit and the suction transport unit, and brought to the waste toner box.

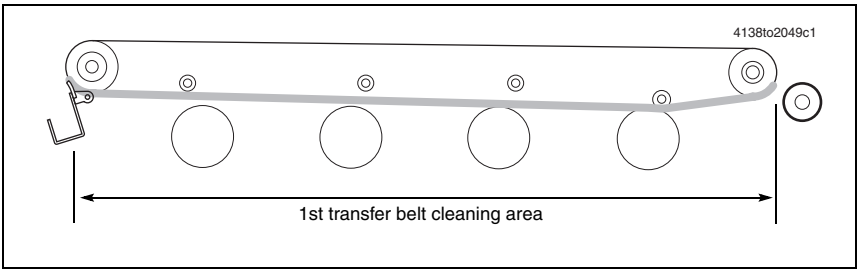


14.3.7 1st transfer belt cleaning control

- If there is a possibility of the main body being stopped with toner left on the surface of the transfer belt between the cleaning blade position and the 2nd transfer position (due to a media misfeed or malfunction), the Transport motor is energized to turn the transfer belt. The residual toner is thereby removed from the transfer belt.
- No forced cleaning sequence is carried out to clean the entire surface of the transfer belt.

A. Operation timing

- The 1st transfer cleaning sequence is carried out before the 2nd transfer cleaning as part of the initial operation sequence.
- The 1st transfer cleaning sequence is carried out before the 2nd transfer cleaning operation is performed by the ATVC control system.



14.3.8 1st transfer belt backward rotation control

- To prevent media dust, toner, and other foreign matter from being wedged in the cleaning blade while the transfer belt remains stationary, the transfer belt is turned backward so that the foreign matter can be removed.
- Once the transfer belt is started turning backward, this operation takes precedence over any other request for energizing the Transport motor. Such a request is honored after the backward rotation control is completed.

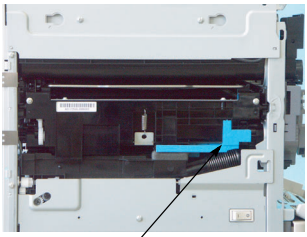
A. Operation timing

- The 1st transfer belt backward rotation is performed after a predetermined number of printed pages are produced after the execution of the last backward rotation control.

14.3.9 Toner collecting port shutter mechanism

- A shutter mechanism is provided to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the shutter lever in the “locked” position (to the front side of the main body) closes the shutter of the toner collecting port.
- The transfer belt unit can be removed after removing the waste toner box, closing the shutter of the toner collecting port, and removing the fixing screws.
- A preventive mechanism works to stop the transfer belt unit from being removed with the toner collecting port opened. Due to the shutter lever interfering with the suction transport unit, the transfer belt unit cannot be removed until the shutter lever is placed in the locked position. Similarly, to install the transfer belt unit, the shutter lever needs to be placed in the locked position so that the shutter lever will not interfere with the suction transport unit.
- To prevent the toner collecting port shutter from leaving unopened after the installation of the transfer belt unit, installing the waste toner box pushes the shutter lever of the toner collecting port and opens the collecting port.

Locked



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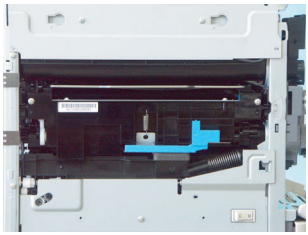
Unlocked



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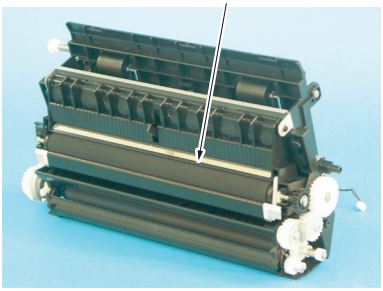
15. Transfer section (2nd transfer)

15.1 Composition



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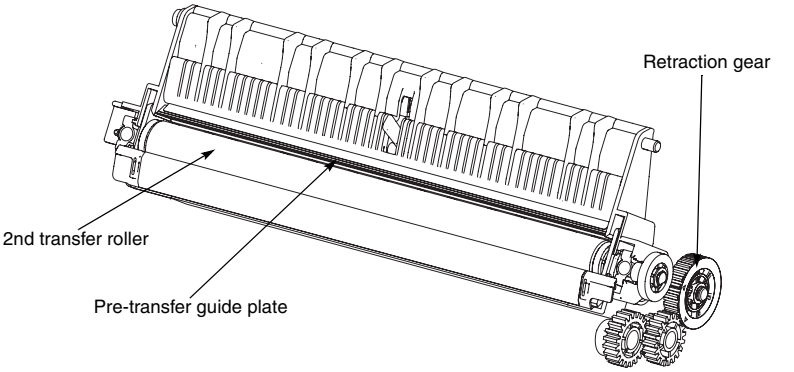

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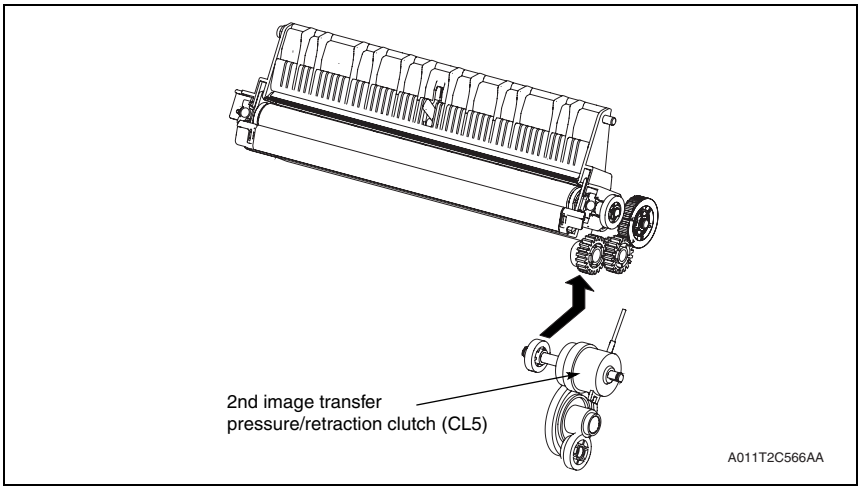
15.2 Drive



15.3 Operation

15.3.1 2nd transfer roller pressure mechanism

- The main body is provided with a mechanism that presses the 2nd transfer roller up against, and retracts it from, the transfer belt. This is done to prevent the 2nd transfer roller from being dirtied due to patterns produced for purposes other than an actual printing operation. Such patterns may be produced during the image stabilization sequence or another function.

A. 2nd transfer roller pressure

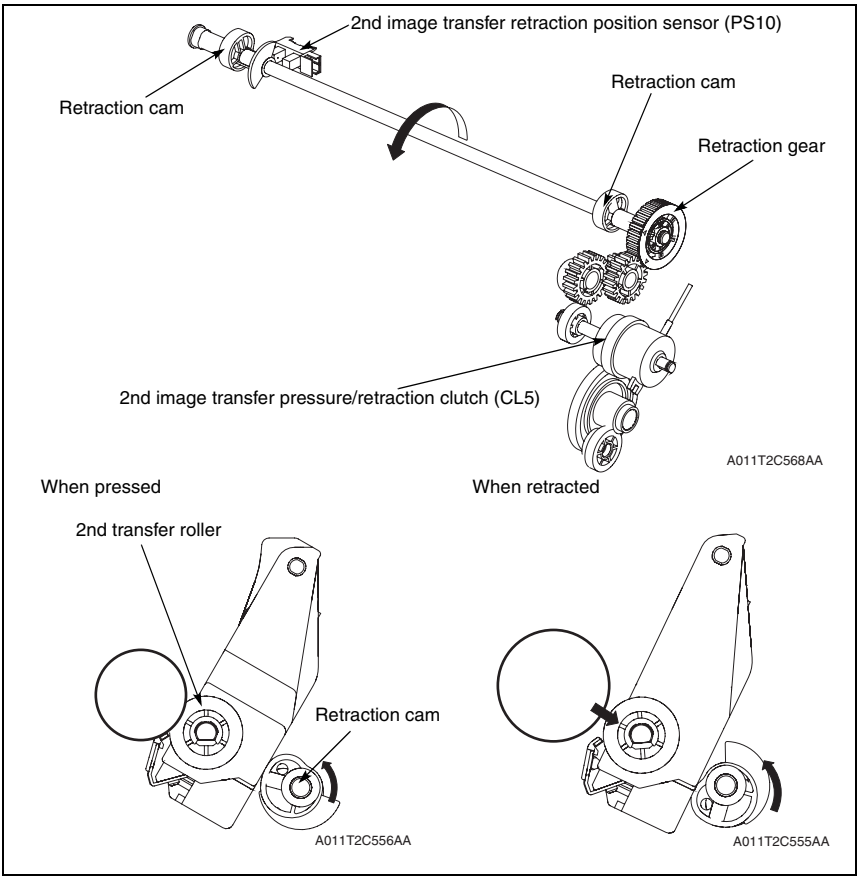
- The 2nd transfer roller is pressed against the transfer belt to allow the toner image on the transfer belt to be transferred onto the media.
- The 2nd transfer roller is pressed against the transfer belt to allow the roller to be cleaned.

B. 2nd transfer roller retraction

- The 2nd transfer roller is retracted from the transfer belt when a detection pattern is produced on the transfer belt for registration correction control, image stabilization control, or other control.
- The 2nd transfer roller is retracted from the transfer belt after the 2nd transfer of the last image is completed during a multi-print cycle.

C. Pressure/retraction operation

1. Rotation of the Transport motor is transmitted to the drive roller of the intermediate transfer belt unit.
2. Rotation of the drive roller is transmitted to the 2nd image transfer pressure/retraction clutch.
3. When the 2nd image transfer pressure/retraction clutch is energized, the rotation is transmitted to the pressure cam via a coupling gear.
4. When the pressure cam turns a half turn, the 2nd transfer roller is pressed against the transfer belt.
5. At the same time, the IDC sensor lever is pushed up to open the IDC sensor cover.
6. The light blocking plate fitted on the shaft of the pressure cam blocks the 2nd image transfer retraction position sensor and a pressed position of the 2nd transfer roller is detected.
7. When the 2nd image transfer pressure/retraction clutch is energized a second time, the pressure cam is turned another half turn. The 2nd transfer roller to be retracted from the transfer belt. At the same time, the IDC sensor lever is released, which closes the IDC sensor cover.
8. The light blocking plate unblocks the 2nd image transfer retraction position sensor and a retracted position of the 2nd transfer roller is detected.



15.3.2 2nd transfer voltage control

- The transfer voltage is applied to the 2nd transfer roller in order to transfer the toner image from the transfer belt to the media.
- The transfer voltage is applied after the 2nd transfer roller has been pressed against the transfer belt.

15.3.3 2nd transfer voltage setting control (ATVC: auto transfer voltage control)

- The transfer voltage is corrected to reduce effect from the transfer belt and environmental changes of toner.

A. Operation timing

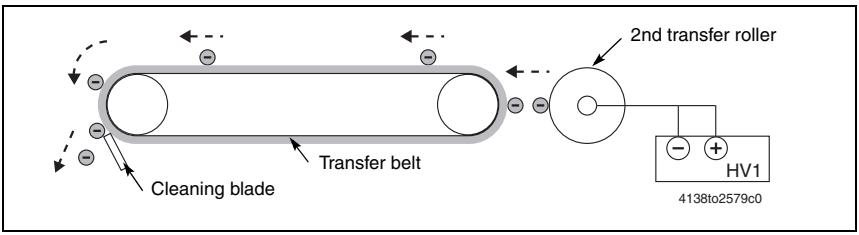
- A print request is accepted.
- During a multi-print cycle, the temperature inside the main body changes by a predetermined value or more from the level during execution of ATVC, and a predetermined number of printed pages or more have been produced since the execution of the previous ATVC.

B. Control

1. 1. The 2nd transfer roller is pressed against the transfer belt.
2. A constant current is applied to the 2nd transfer roller.
3. The voltage of the 2nd transfer roller surface is detected.
4. Using a conversion formula, the output value of the transfer voltage is determined.
5. The current temperature inside the main body is detected and backed up.

15.3.4 2nd transfer roller cleaning control

- DC positive and negative transfer bias voltages are alternately applied to the 2nd transfer roller. This allows toner residue on the surface of the 2nd transfer roller to be transferred back to the transfer belt, thus cleaning the 2nd transfer roller.
- Any voltage for other control purposes is not applied during the cleaning procedure.
- The toner transferred back to the transfer belt is collected by the cleaning blade.

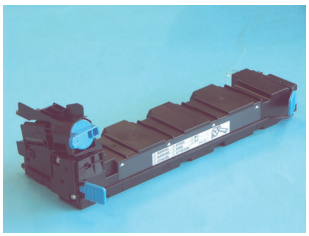


A. Operation timing

- The power switch is turned ON.
- The 2nd transfer roller cleaning sequence is carried out after the intermediate transfer belt has been cleaned during recovery from a media misfeed or malfunction.
- If 100 printed pages or more have been produced after the last cleaning sequence when the printer completes a print cycle and is then brought to a stop, a new cleaning sequence is carried out before the printer is brought to a stop.
- The cleaning sequence is carried out when a media size error occurs.

16. Waste toner collecting section

16.1 Composition



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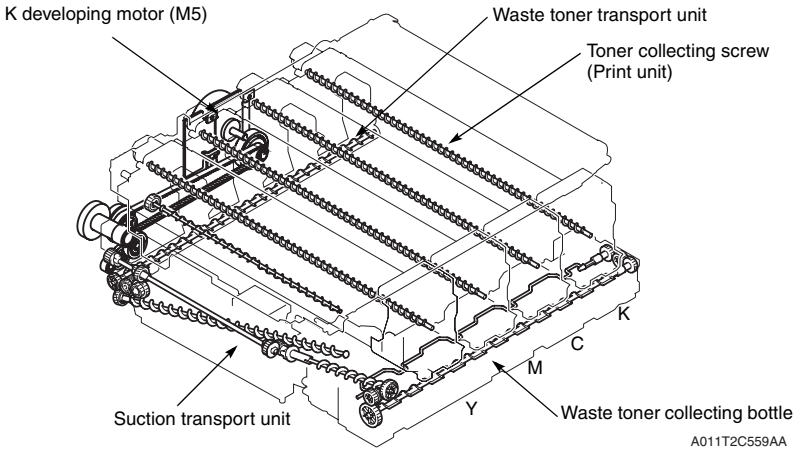
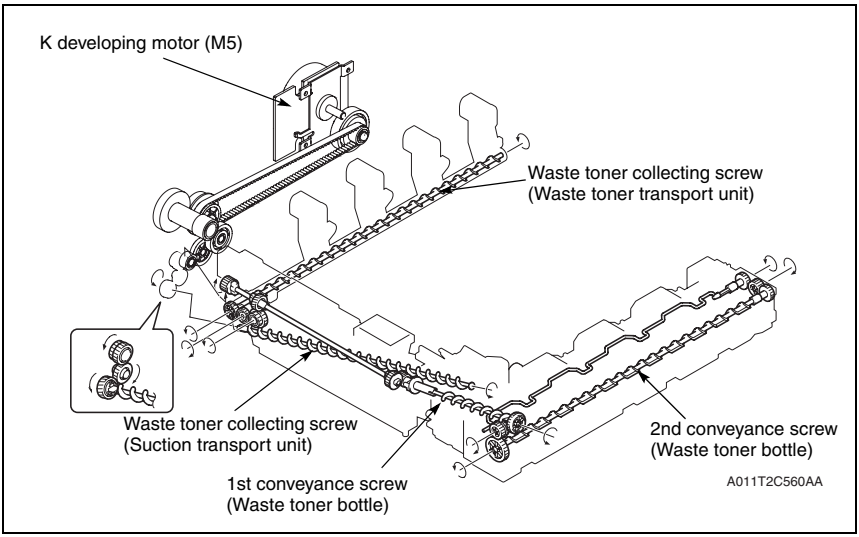


A011T2C559AA

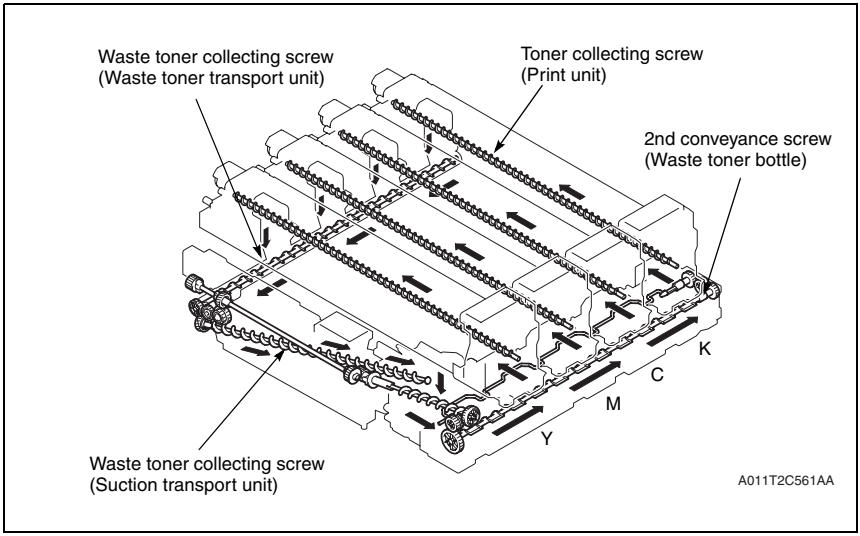
16.2 Drive


K developing motor (M5)
Waste toner collecting screw
(Waste toner transport unit)
Waste toner collecting screw
(Suction transport unit)
1st conveyance screw
(Waste toner bottle)
2nd conveyance screw
(Waste toner bottle)
A011T2C560AA

16.3 Operation

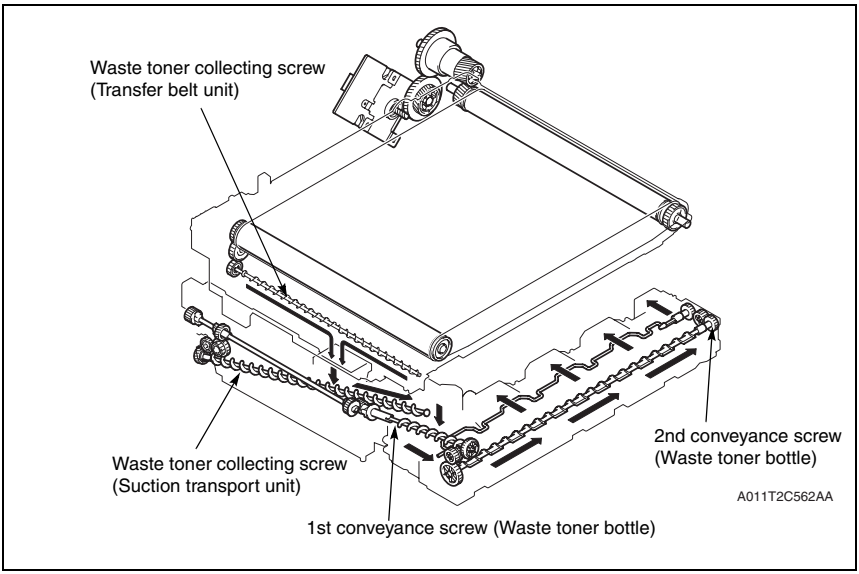
16.3.1 Toner flow at the 1st transfer section

1. Toner scraped off by the cleaning blade in the print unit is conveyed to the toner collecting port by the toner collecting screw.
2. The waste toner conveyed to the toner collecting port is conveyed to the waste toner transport unit.
3. The toner conveyed is carried to the suction transport unit by the transport roller provided in the waste toner transport unit.
4. The conveyed toner is carried to the toner collecting port of the waste toner box by the conveyance screw provided in the suction transport unit.
5. The toner conveyed is stored into in the waste toner box by the conveyance screw provided in the waste toner box.



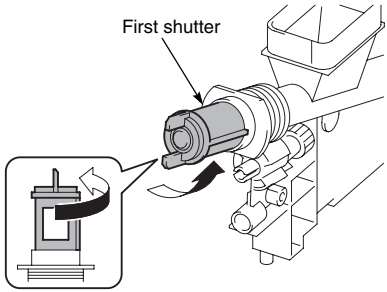
16.3.2 Toner flow at the 2nd transfer section

1. Toner scraped off by the cleaning blade provided in the transfer belt unit is collected onto the middle of the transfer belt unit by the toner collecting screw.
2. The toner collected is conveyed to the suction transport unit through the toner collecting port that is provided in the middle of the transfer belt unit.
3. The conveyed toner is carried to the toner collecting port of the waste toner box by the conveyance screw provided in the suction transport unit.
4. The toner conveyed is stored into in the waste toner box by the conveyance screw provided in the waste toner box.

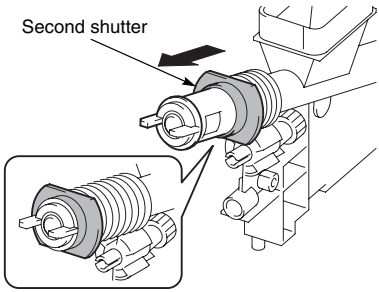


16.3.3 Toner collecting port shutter mechanism at the suction transport unit

- A dual-shutter is used to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the box lock lever of the waste toner box in the “unlocked” position (the 9 o'clock position) closes the first shutter of the toner collecting port.
- Removing the waste toner box closes the second shutter.



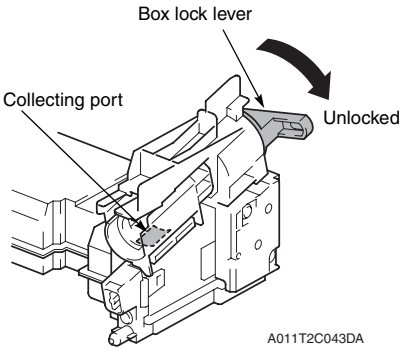
A011T2C041DA



A011T2C042DA

16.3.4 Toner collecting port shutter mechanism of the waste toner bottle

- A shutter is used to prevent waste toner from being spilled from the toner collecting port when the waste toner box is removed and reinstalled.
- Placing the box lock lever of the waste toner box in the “unlocked” position (the 9 o'clock position) closes the shutter of the toner collecting port.



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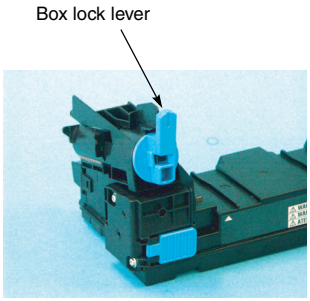

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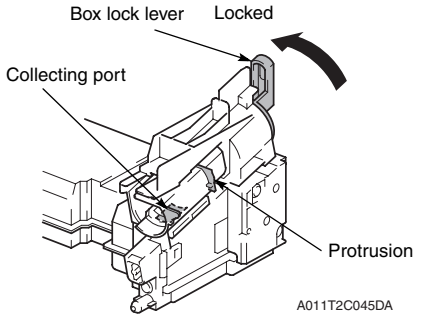
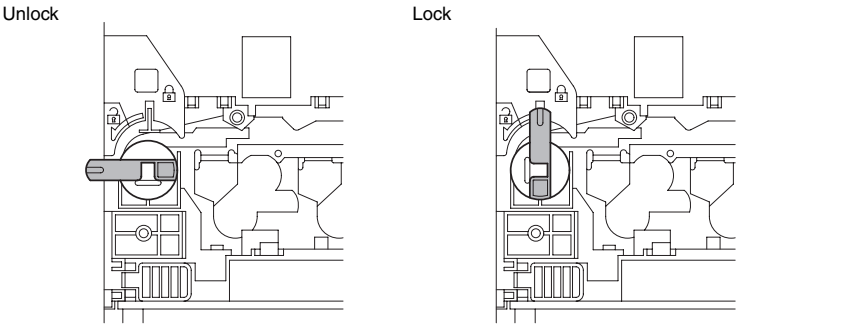
16.3.5 Waste toner box locking mechanism

- When the box lock lever is in the locked position (the 12 o'clock position), the protrusion provided at the toner collecting port interferes with the main body frame, thus preventing the waste toner box from being removed.
- When the box lock lever is in the unlocked position (the 9 o'clock position), the waste toner box can be removed.



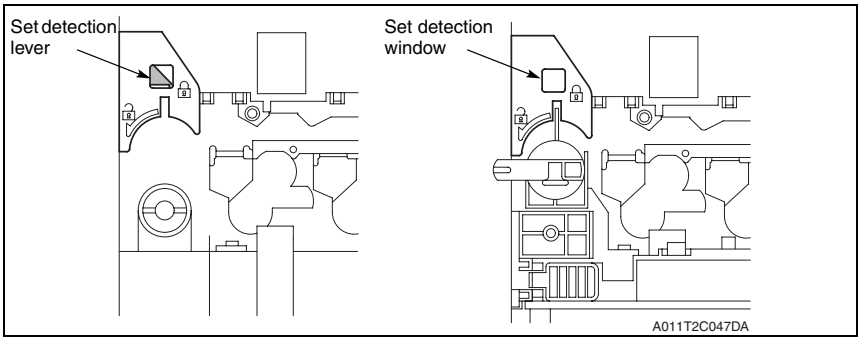
16.3.6 Waste toner box locked position detection mechanism

- When the box lock lever is in the unlocked position (the 9 o'clock position), the protrusion provided in the front door interferes with the box lock lever. As a result, the front door cannot be closed.
- When the box lock lever is in the locked position (the 12 o'clock position), the front door can be closed.



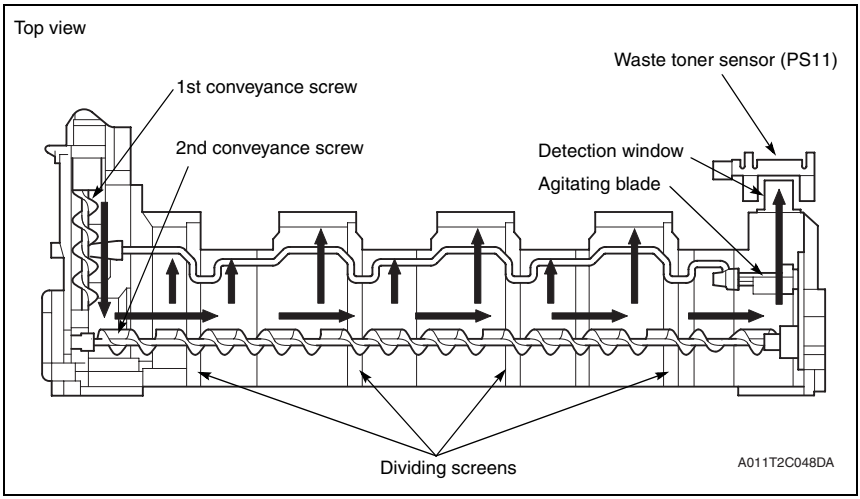
16.3.7 Waste toner box-in-position detection mechanism

- The waste toner box set detection lever is provided to detect a waste toner box loaded in position.
- When the waste toner box is not loaded, the set detection lever lowers by its own weight to plug the set detection window.
- The protrusion provided in the front door interferes with the set detection lever that plugs the set detection window. Then, the front door cannot be closed.
- When the waste toner box is loaded in position, it pushes up the set detection lever to uncover the set detection window.



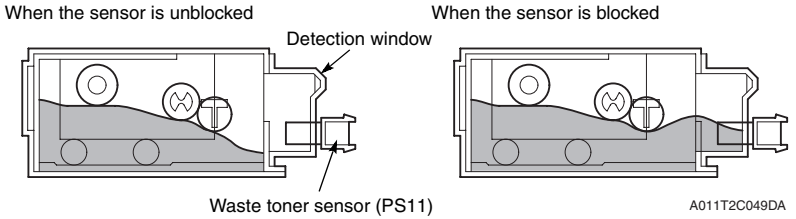
16.3.8 Waste toner flow in the waste toner box

1. Toner conveyed to the toner collecting port is conveyed to the 2nd conveyance screw by the 1st conveyance screw provided in the waste toner box.
   he toner is conveyed into the waste toner box by the 2nd conveyance screw.
2. In order for waste toner to be accumulated from the left side, the waste toner box has the dividing screens.
3. Waste toner conveyed to the rear end of the box is conveyed up to the detection window by the agitating blade. When the waste toner conveyed to the detection window blocks the waste toner sensor, the waste toner near full condition is detected.



16.3.9 Waste toner near-full condition detection control

- A waste toner near-full condition is detected when the waste toner sensor continuously blocks for a predetermined period of time.
- At this time, a waste toner near-full condition warning is given on the panel.

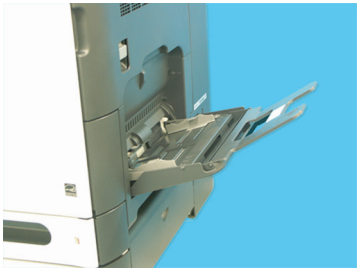


16.3.10 Waste toner full condition detection control

- A waste toner full condition is detected when the cumulative total number of print dots (waste toner detection dot count) exceeds a predetermined value after a waste toner box near-full condition has been detected.
- A waste toner full condition warning is given on the panel at this time.
- The main body accepts no print job after the waste toner full condition has been detected.
- The waste toner full warning indication disappears when a new waste toner bottle is installed.

17. Media feed section (Tray 1)

17.1 Composition



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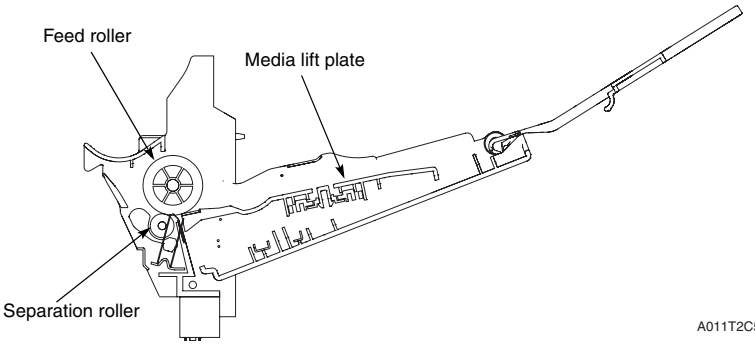
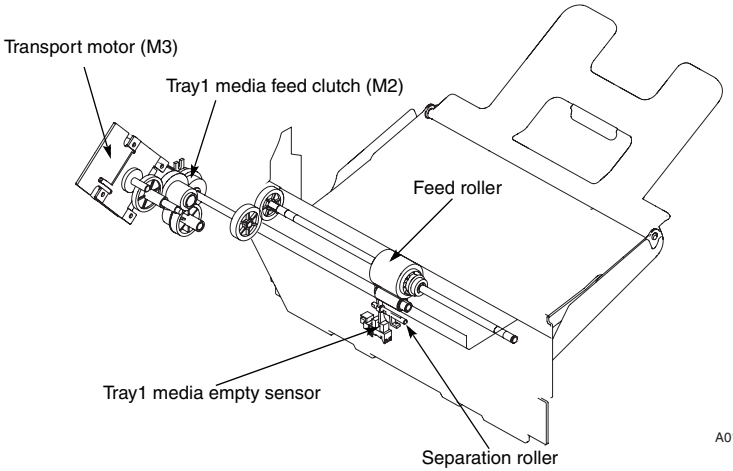
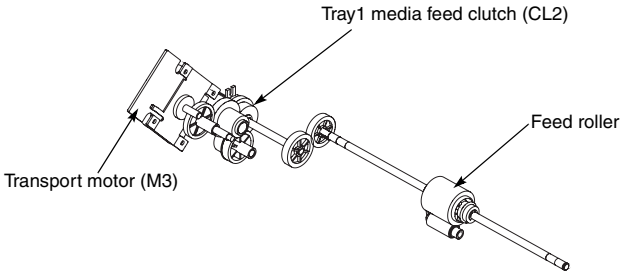


A011T2C553AA



A011T2C554AA

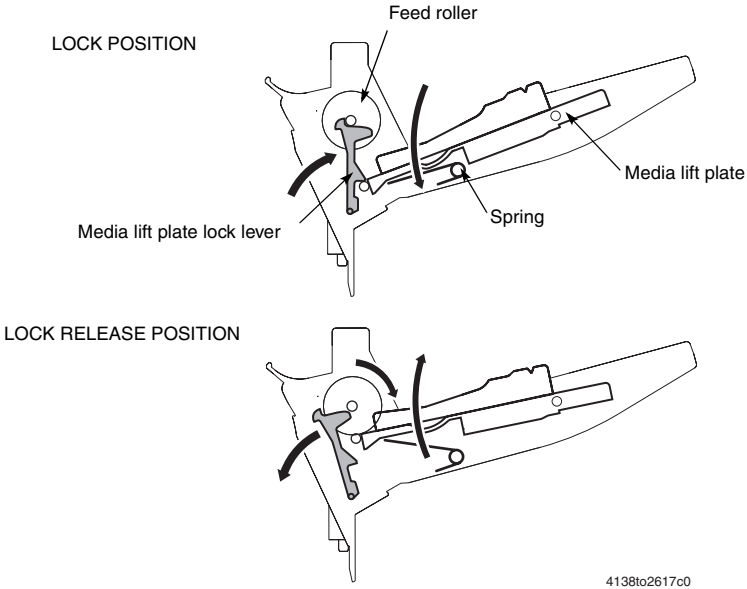
17.2 Drive



17.3 Operation

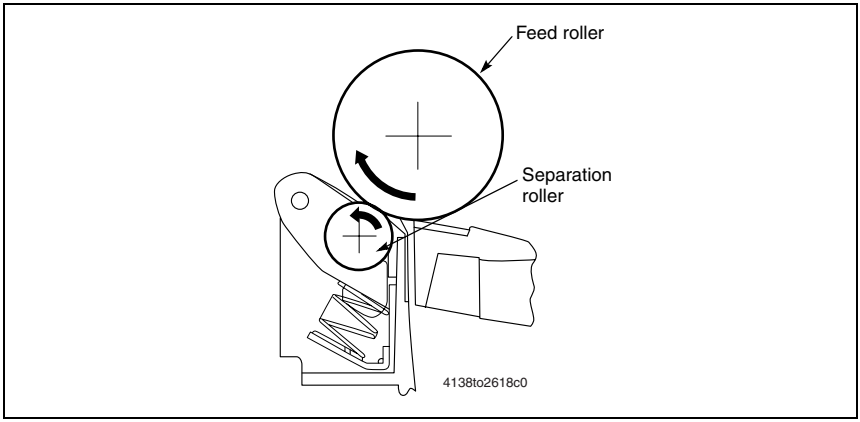
17.3.1 Media lift plate mechanism

- The media lift plate will be locked under the media lift plate lock lever by pressing it down (in which the media is loaded in position). The media lift plate lock lever will be pressed to the feed roller.
- The media feed clutch will rotate the feed roller to activate the lock release lever pressed to the feed roller, and the media lift plate will be unlocked.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



17.3.2 Media separation mechanism

- Drive from the Transport motor is transmitted through the Tray1 media feed clutch to turn the feed roller.
- The feed roller rotates to take up and feed media into the main body.
- Double-feeding of media is prevented by the separation roller provided with a torque limiter.

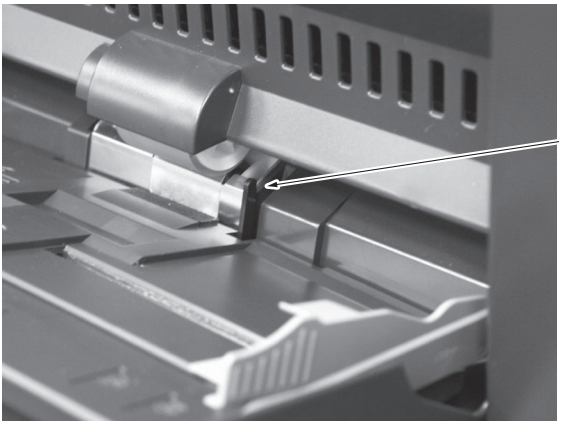


17.3.3 Media feed control

- Drive from the transport motor is transmitted through the tray1 media feed clutch to turn the feed roller, thereby taking up and feeding the media.
- The media taken up and fed in is conveyed onto the registration roller.
- The media is pressed against the stationary registration roller so that a loop is formed in the media. The feed roller is then stopped. The loop thus formed in the media corrects any mechanical skew in the media.

17.3.4 Media empty condition detection control

- A media empty condition is detected when the empty sensor actuator unblocks the tray1 media empty sensor.
- No mechanism is provided for detecting a media near-empty condition. The media supply level indicator serves this purpose.



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18. Media feed section (Tray 2)

18.1 Composition

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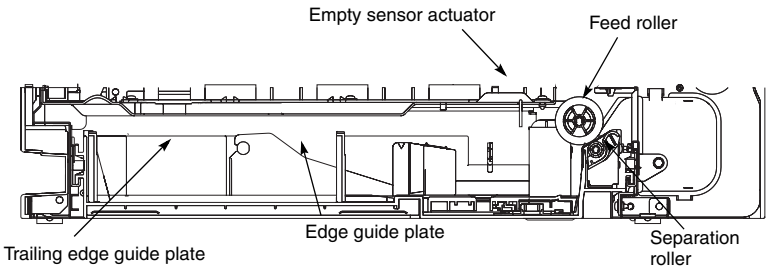
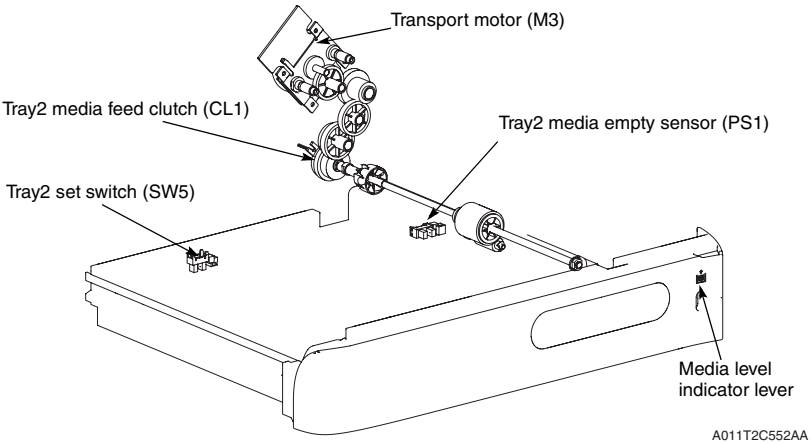
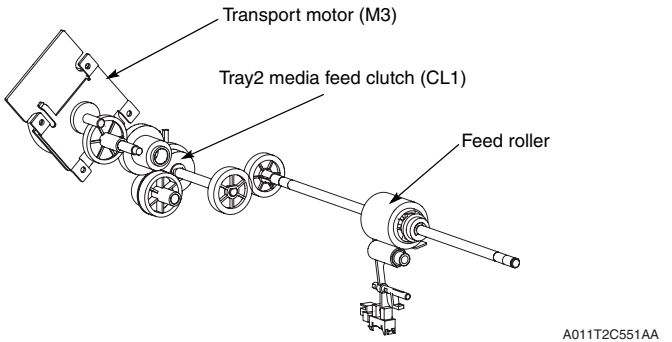


A011T2C558AA


Transport motor (M3)
Tray2 media feed clutch (CL1)
Tray2 media empty sensor (PS1)
Tray2 set switch (SW5)
Media level indicator lever

A011T2C552AA

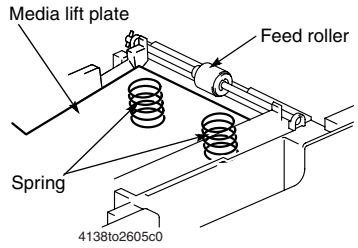
18.2 Drive



18.3 Operation

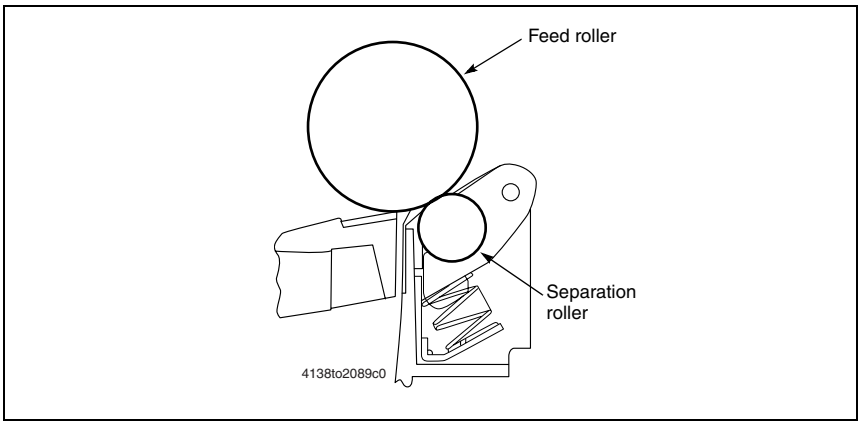
18.3.1 Media lift plate mechanism

- The media lift plate is pressed down into the locked position (in which the media is loaded in position).
- Load a media stack and then slide the tray into the main body. This causes the lock release lever to unlock the media lift plate.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



18.3.2 Media separation mechanism

- Drive from the transport motor is transmitted through the tray2 media feed clutch to turn the feed roller.
- The feed roller rotates to take up and feed media into the main body.
- Double-feeding of media is prevented by the separation roller provided with a torque limiter.

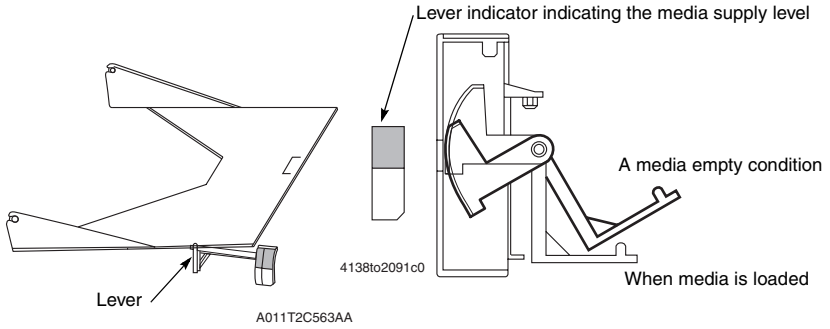


18.3.3 Media feed control

- Drive from the transport motor is transmitted through the tray2 media feed clutch to turn the feed roller, thereby taking up and feeding the media.
- The media taken up and fed in is conveyed onto the registration roller.
- The media is pressed against the stationary registration roller so that a loop is formed in the media. The feed roller is then stopped. The loop thus formed in the media corrects any mechanical skew in the media.
- As the trailing edge of the media reaches a point immediately before the feed roller, the feed roller is stopped.

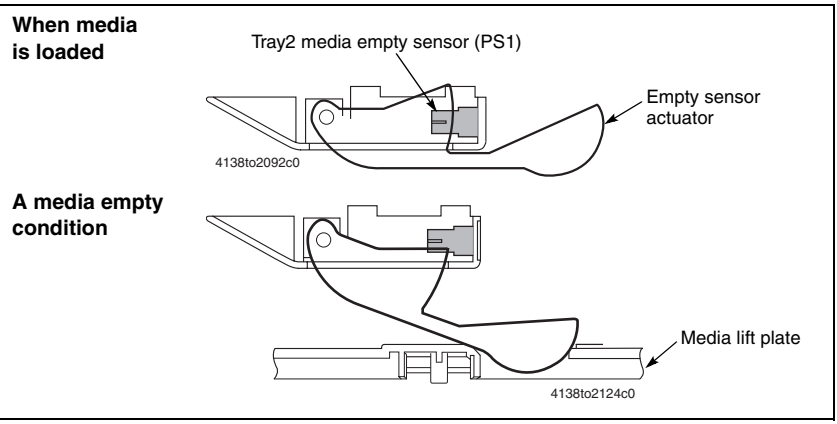
18.3.4 Media supply level detection control

- There is a window in the front cover of the cassette for indicating the media supply level.
- When the media lift plate goes up, a red lever appears in the window. The lower the level of the media stack, the more the red portion is visible.



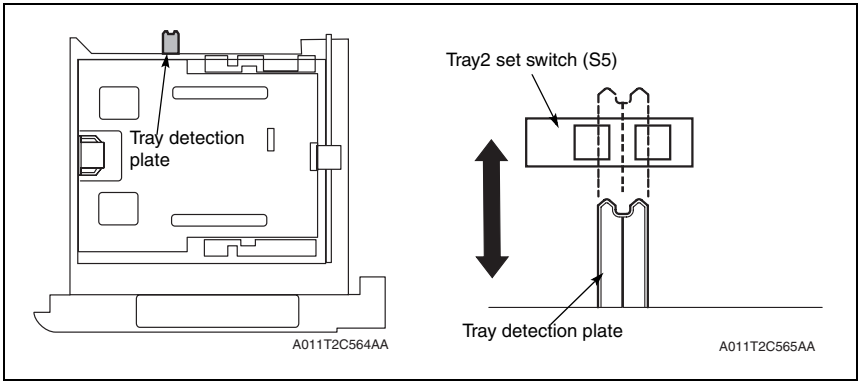
18.3.5 Media empty condition detection control

- The media empty message “PAPER EMPTY TRAY2” is displayed on the panel when the empty sensor actuator unblocks the media empty sensor.
- No mechanism is provided for detecting a media near-empty condition. The media supply level indicator replaces this function.



18.3.6 Tray open/close detection control

- Whether tray is opened or closed is detected with the tray 2 set switch.
  1. Closing the tray will make the detecting plate press and turn ON the tray 2 set switch mounted on the main body frame.
  2. The switch will be OFF if the tray is pulled out, and “PAPER EMPTY TRAY 2” will appear.

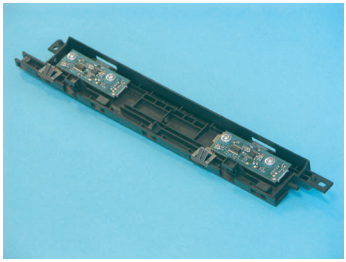


18.3.7 Media misfeed detection control

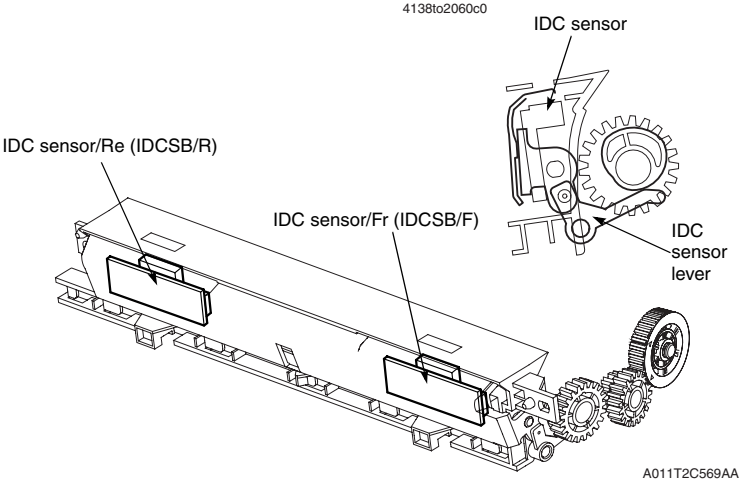
- If the registration sensor is not activated within a predetermined period of time after a media feed sequence has been started, the main body determines that there is a media misfeed. It then gives the message “PAPER EMPTY TRAY 2” on the panel.
- The media misfeed display can be reset by opening and closing any of the doors.

19. Conveyance section (IDC sensor)

19.1 Composition



4138to2060c0



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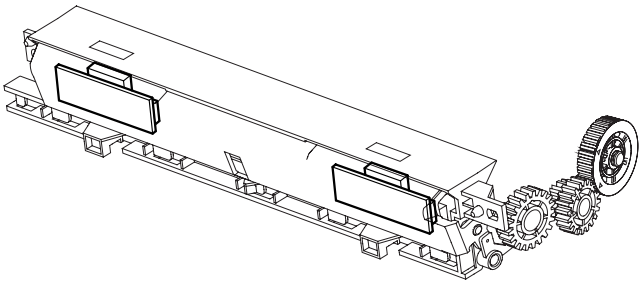
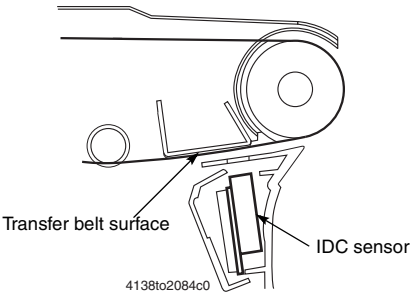
19.1.1 Drive

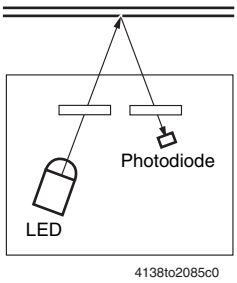


19.2 Operation

19.2.1 Toner density detection control

- A reflective sensor is used for the IDC sensor that detects the amount of toner sticking to the surface of the transfer belt. Image stabilization is performed based on the value detected.
- The detection pattern (toner image) produced on the surface of the transfer belt is irradiated with light emitted by the LED of the sensor.
- The photodiode of the sensor detects the light reflected off the toner pattern on the surface of the transfer belt.





- A voltage corresponding to the intensity of the light reflected off the toner pattern is output to the MFP board.

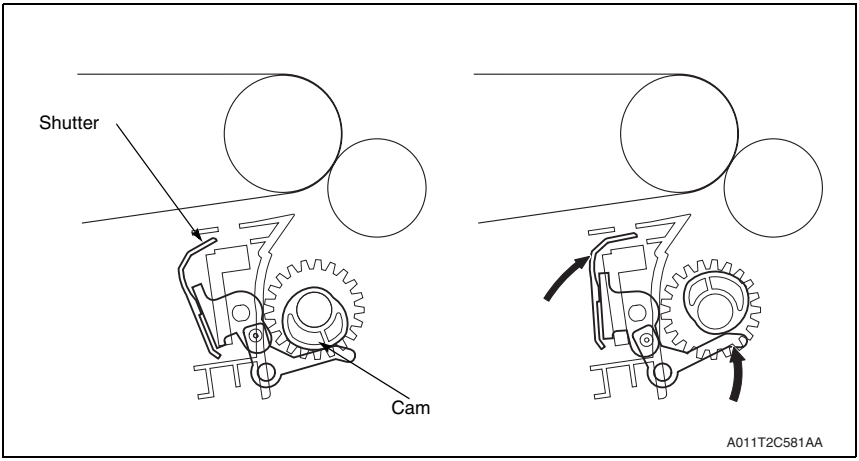
Amount of toner sticking	Intensity of light reflected	Output
Large	Small	Low
Small	Great	High

19.2.2 IDC sensor calibration control

- Changes in various types of characteristics due to change with time of the IDC sensor (deteriorated LED, dirty sensor surface), part-to-part variations in the sensors, and change of environment affect the IDC sensor output corresponding to the clear transfer belt surface. To correct fluctuations in the output, the sensor LED intensity is adjusted so as to keep constant the IDC sensor output value.

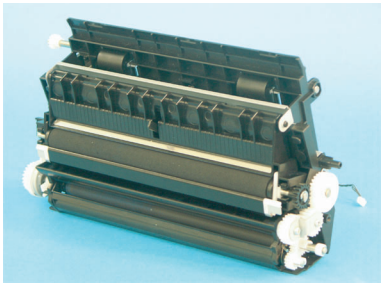
19.2.3 IDC sensor shutter mechanism

- Since the IDC sensor is installed below the transfer belt, it can be dirtied with toner or other foreign matter. A shutter mechanism is therefore provided above the IDC sensor to prevent it from being dirtied.
- The shutter is opened or closed in synchronism with the pressure or retraction motion of the 2nd transfer roller. When the 2nd transfer roller is pressed, the Cam pushes up the sensor lever, which opens the shutter above the IDC sensor.
- When the 2nd transfer roller is released, the shutter above the IDC sensor is closed by the tension of a spring.



20. Conveyance section (Registration roller)

20.1 Composition



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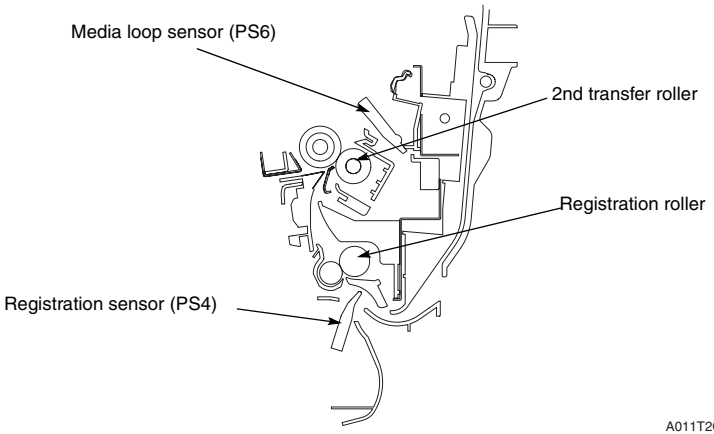

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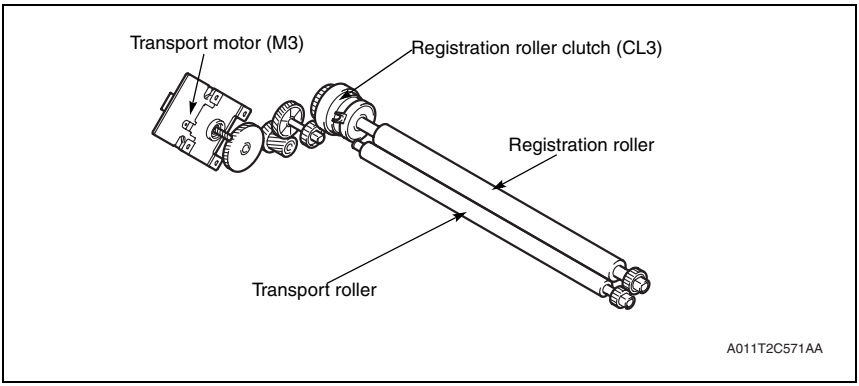
20.2 Drive


Transport motor (M3)
Registration roller clutch (CL3)
Registration roller
Transport roller
A011T2C571AA

20.3 Operation

20.3.1 Conveyance speed control

- The Transport motor provides drive for the conveyance section.
- The conveyance speed is variable in two steps and the appropriate one is selected according to the media type and print mode as detailed below.

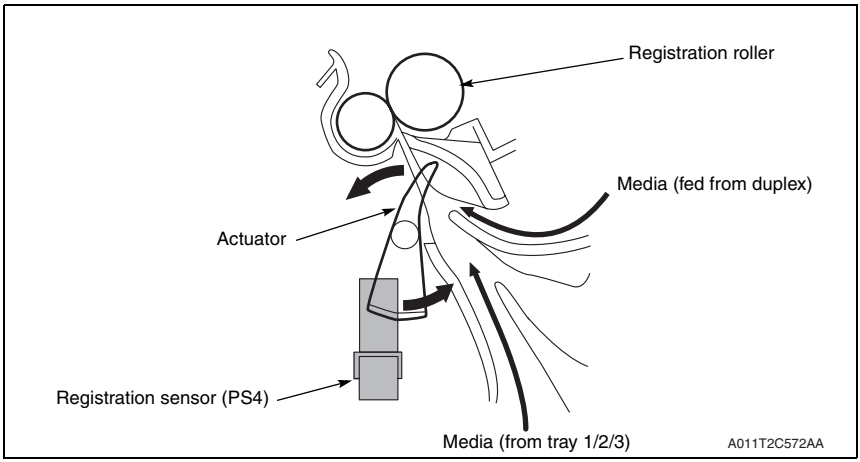
Media type/print mode	Conveyance speed
Plain media	144 mm/s
Thick stock, envelopes, postcards, label, OHP transparencies, glossy paper	72 mm/s

20.3.2 Registration roller control

- When the media taken up and fed in by the feed roller reaches the registration roller, a loop is formed in the media and media conveyance is temporarily stopped. Conveyance skew is corrected by this loop.
- The registration sensor detects whether or not the media has reached the registration roller.
- The media fed in is synchronized with the image before media conveyance is restarted.

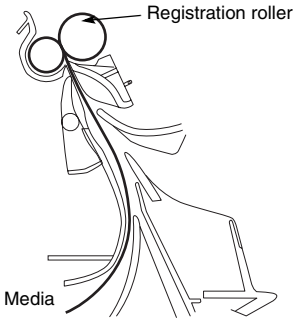
A. Media detection control

- When the media fed from the feed roller pushes up the actuator of the registration sensor, the sensor is unblocked. With this event occurring, the main body determines that the media has reached the position before the registration roller.



20.3.3 Control of loop formed before registration roller

- Media conveyance is stopped after the lapse of a predetermined period of time after the leading edge of the media fed from the feed roller has reached the registration roller. This forms a loop in the media.
- The loop in the media corrects skew in the media.



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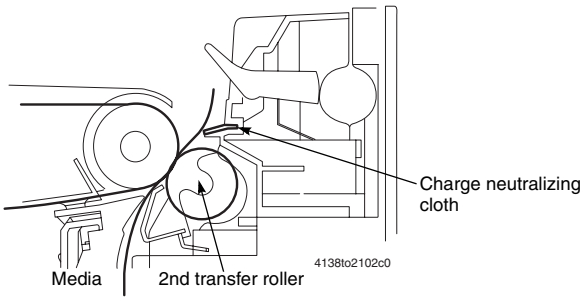
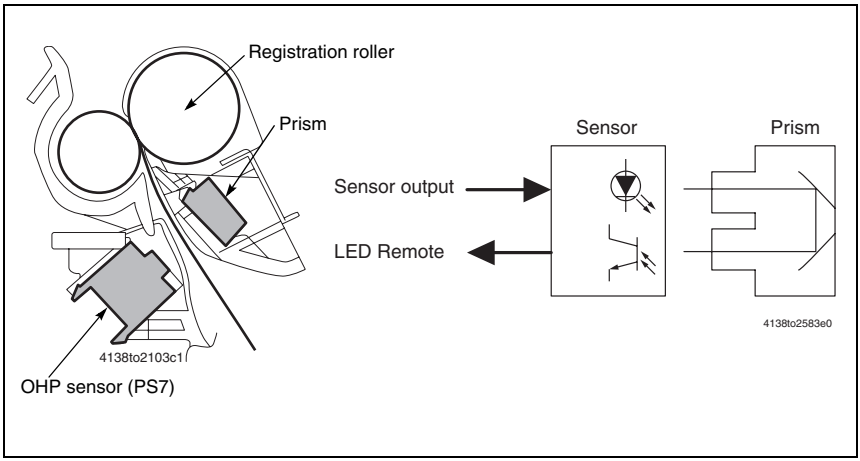
20.3.4 Media neutralization

- The charge neutralizing cloth neutralizes any charge left in the media after the 2nd transfer process.
- The charge residue is grounded through the charge neutralizing cloth to the main body frame.



20.3.5 OHP transparencies detection control

- To prevent incorrect prints on OHP transparencies, the type of the media being conveyed is detected by the OHP sensor.
- The OHP detection is made after the loop has been formed in the media before the registration roller.
- If the output voltage of the OHP sensor is less than a predetermined value, the main body considers that the media is a type other than OHP transparencies. If the output voltage is the predetermined value or more, the main body determines that the media is OHP transparencies.



20.3.6 Media size error detection control

- To prevent incorrect printed pages, the size of the media being conveyed is detected using the registration sensor and media feed sensor.
- The length of the media is detected based on the value calculated using the period of time that begins when the sensor is activated and ends when it is deactivated for each media source.
- For the lower feeder unit, even if the media feed sensor does not detect a media size error, the downstream registration sensor makes an error check again.

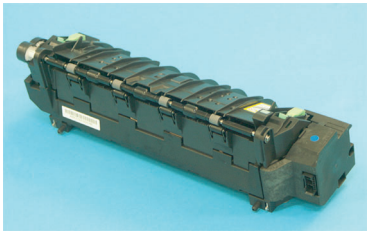
Media source	Media length detection sensor	Starting point	Ending point
Tray 1	Registration sensor (PS4)	Registration roller clutch CL2: ON	Registration sensor PS4: OFF
Tray 2	Registration sensor (PS4)	Registration roller clutch CL2: ON	Registration sensor PS4: OFF
Tray 3 (Lower feeder unit)	Media feed sensor (PS2: Tray 3)	Media feed sensor PS2: ON	Media feed sensor PS4: OFF
	Registration sensor (PS4)	Registration roller clutch CL2: ON	Media feed sensor PS4: OFF

20.3.7 Temperature/humidity sensor

- The temperature/humidity sensor detects temperature and humidity inside the main body.
- The detected data are used for image stabilization control, ATVC control, and transfer output control.

21. Fusing section

21.1 Composition



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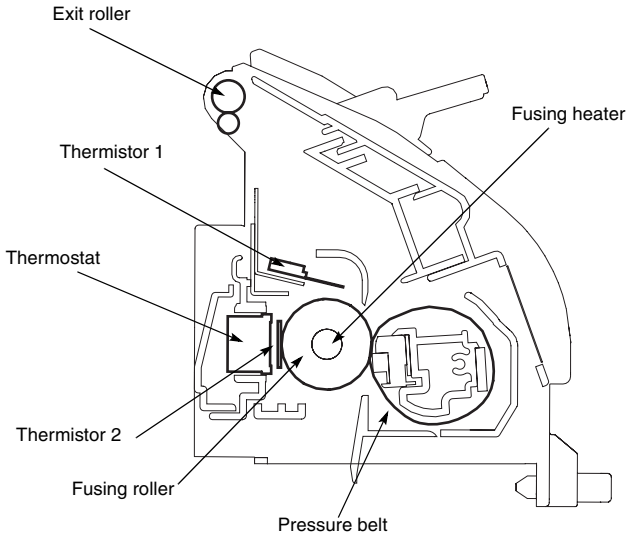

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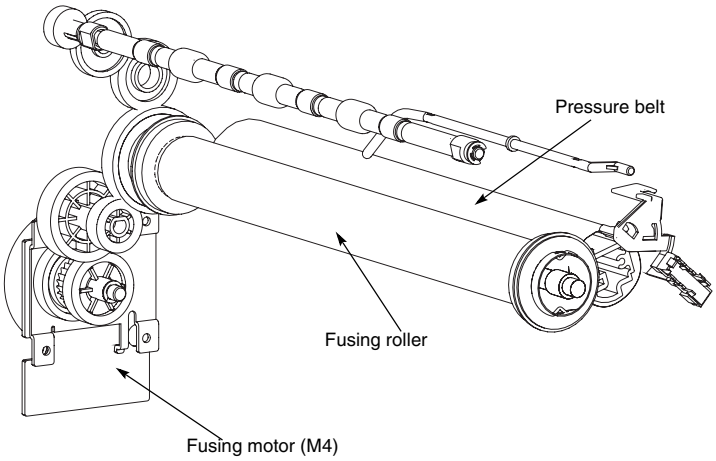
21.2 Drive



21.3 Operation

21.3.1 Fusing roller drive control

A. Fusing speed switching control

- The fusing motor provides drive for the fusing section.
- To prevent poor fusing performance, the fusing speed is changed in two steps according to the media type.

	Plain paper (mm/s)	Thick paper, envelops, gloss paper, OHP (mm/s)
Fusing speed	144	72

B. Fusing speed control (control of loop before fusing)

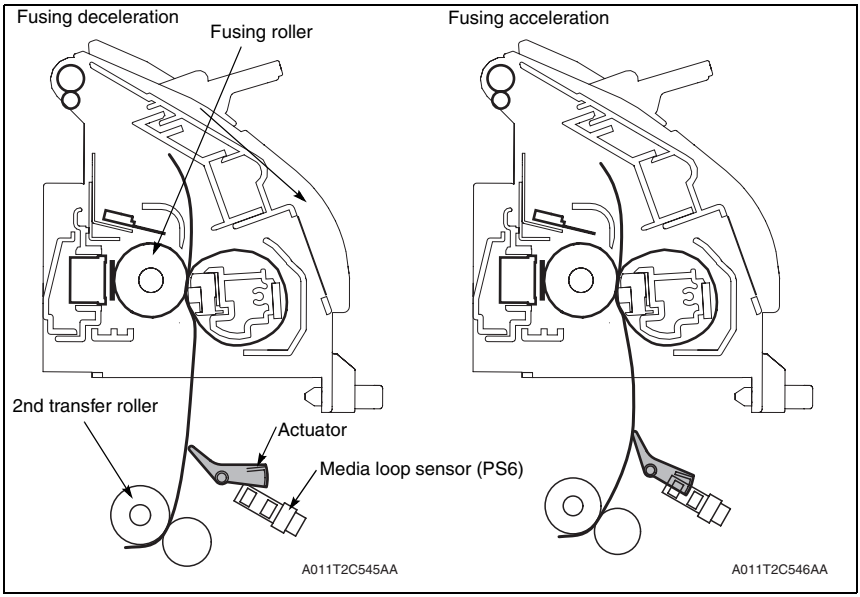
- To prevent double transferred images and brush effects from occurring, the difference between the fusing speed and the media conveyance speed during image transfer is corrected.
- The media loop sensor detects the length of the loop formed in the media between the 2nd transfer roller and the fusing pressure roller. The fusing speed is then varied according to the length of the loop detected. By varying the fusing speed, media is prevented from being misfed or contacting the charge neutralizing cloth.
  No loop control is provided to perform the fusing process when envelopes are used (to prevent wrinkles).

(1) Fusing deceleration (low speed):

- When the media loop length is small, the actuator of the media loop sensor is pushed up a small amount and the sensor is unblocked. When the sensor is unblocked, the fusing speed is decelerated.

(2) Fusing acceleration (high speed):

- When the media loop length is large, the actuator of the media loop sensor is pushed up a large amount and the sensor is blocked. When the sensor is blocked, the fusing speed is accelerated.

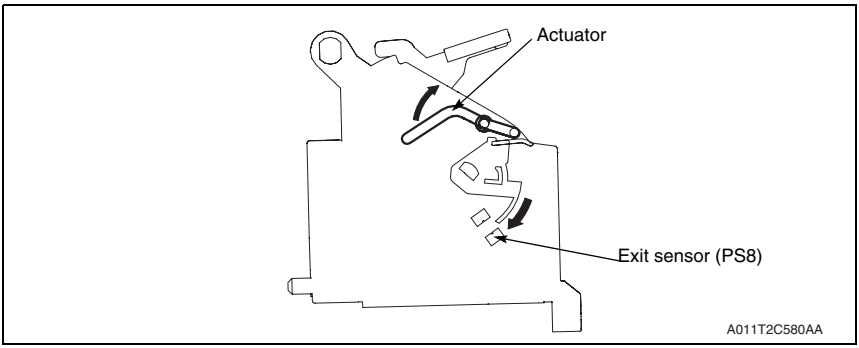


C. Fusing roller deformation prevention control

- To prevent the fusing roller from being deformed, the fusing roller is forcibly turned if it is left idle for a predetermined period of time.
- Operation timing
  1. If the main body remains in the standby state for more than a predetermined period of time, the fusing motor is turned for the predetermined period of time.
  2. If the main body remains in the power save mode for more than a predetermined number of days, the temperature adjustment is started. After the temperature rises to a predetermined value or more, the fusing motor is turned for a predetermined period of time.

D. Media exit detection control

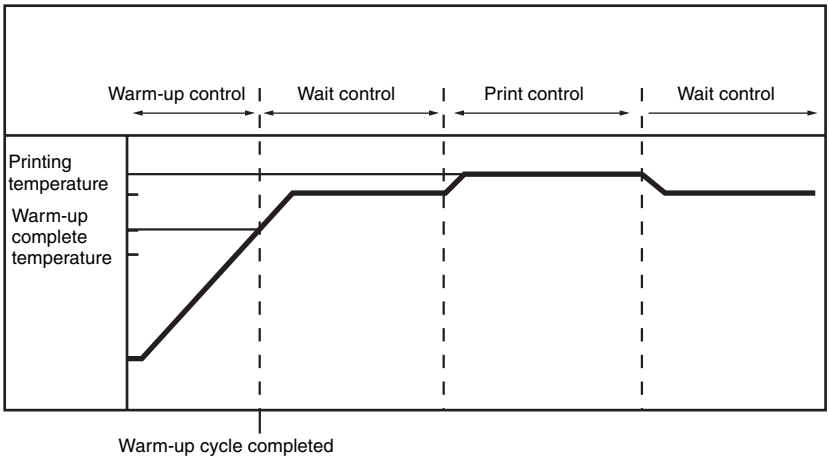
- The exit sensor detects the media conveyed from the fusing roller.
- The exit sensor is placed right after the fusing roller in order to detect the media jam and prevent the media from being wound to the fusing roller.



21.3.2 Fusing temperature control

- To fuse the toner image on the media (image yet to be permanently fixed) properly into the media, the heater lamps are turned ON and OFF as necessary to bring the fusing temperature to an appropriate level.
- Thermistors are used to detect the surface temperature of the Fusing roller. The heater lamps are then turned ON and OFF as necessary to achieve the set temperature.
- The control temperature in the print command wait state is called the standby temperature, while that for permanently fix the toner image on media into the media is called the print temperature.

<Temperature control for plain paper, A4, full color print, ordinary start>



21.3.3 Warm-up control

- Control is provided until the Fusing roller reaches the predetermined level.

A. Control start timing

- The power switch is turned ON.
- A malfunction or media misfeed is reset.
- The main body leaves the power save mode.
- A door is closed.

B. Control termination timing

- The Fusing roller reaches a predetermined temperature.
- A malfunction or media misfeed is reset.
- A door is opened.

C. Control start decision

- Either of the following two control start decisions is made according to the temperature detected by the temperature/humidity sensor (TEM/HUMS). The fusing temperature during the print cycle varies depending on the type of start control, whether low temperature start control or ordinary start control.
- If the information provided by the temperature/humidity sensor is less than a predetermined value
- If the information provided by the temperature/humidity sensor is equal to, or more than, the predetermined value
- If the information provided by the temperature/humidity sensor is the predetermined value or more, the ordinary start control is provided.

21.3.4 Wait control

- Control is provided to ensure that the temperatures at different parts of the fusing unit reach a constant level during the wait state.

A. Control start timing

- At the end of the warm-up control
- At the end of the post-print cycle control (print start control)

B. Control termination timing

- The front cover is opened and closed.
- A malfunction or media misfeed occurs.

21.3.5 Print control

- To ensure a good fixing level and light transmission performance of the OHP transparencies, the fusing speed and fusing roller temperature are controlled.

A. Control start timing

- A print request is received.

B. Control termination timing

- A malfunction or media misfeed occurs.

C. Print control temperatures

- The fusing roller temperature is set according to the type of media, main body interior temperature (as measured by the temperature/humidity sensor), and warm-up start decision.
- For types of media other than plain paper, the fusing speed is controlled at the 1/2 speed.

D. Print control temperature adjustments

- The temperature during print control is adjusted using the menu available from the control panel. The temperature can, however, be decreased only.
- Adjustment steps are 0°C, -5°C, and -10°C.

21.3.6 PPM control

- The PPM control is performed to prevent the fusing pressure roller and the fusing belt temperatures from going down during a multi-print cycle as well as to prevent the temperatures of the roller and belt edges from going up.
- If a multi-print cycle is run using media of a small size, a difference is produced in temperature between the center portion of the roller/belt (the surface over which the media moves past) and the edges of the roller/belt (where no part of the media moves past). To inhibit this situation, the distance between sheets of media is widened and the temperature of the fusing roller is thereby made uniform.

21.3.7 Protection against abnormally high temperature

- The main body provides protection at three different stages to prevent abnormally high temperature of the fusing unit.
  1. Soft protection
  2. Hard protection
  3. Thermostat protection

A. 1st stage: soft protection

- If the thermistor 1 or the thermistor 2 detect a temperature exceeding a predetermined value, the malfunction code representing abnormally high temperature is displayed. At this time, the heater lamps are turned OFF forcibly and the initiation of any new print cycle is prohibited (abnormally high temperature detection control).

B. 2nd stage: hard protection

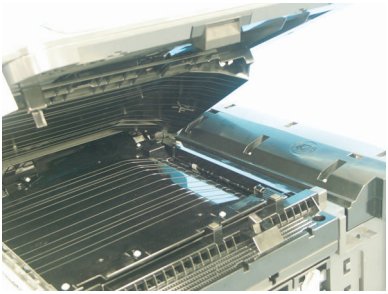
- The following hard protection control is provided if the CPU overruns and becomes unable to detect an abnormally high temperature.
  1. The thermistor/1 or thermistor/2 detect a temperature exceeding a predetermined value.
  2. The remote signal for the corresponding heater lamp of the DC power supply is forcibly turned OFF through the MFP board.
  3. The triac circuit on the DC power supply is turned OFF to shut down the power supply to the corresponding heater lamp.
  4. The heater lamp is forcibly turned OFF.
  5. The temperature detected by the thermistor/1 or thermistor/2 is decreased to a level below the predetermined value.
  6. The remote signal forcible OFF of the corresponding heater lamp is reset so that power supply to the heater lamp is resumed.

C. 3rd stage: Thermostat protection

- If neither the soft protection nor hard protection can detect an abnormally high temperature due to a defective thermistor, the thermostat operate at the specified temperature. This shuts down the power supply to the fusing heater lamp, thus forcibly turning them OFF.

22. Duplex section

22.1 Composition



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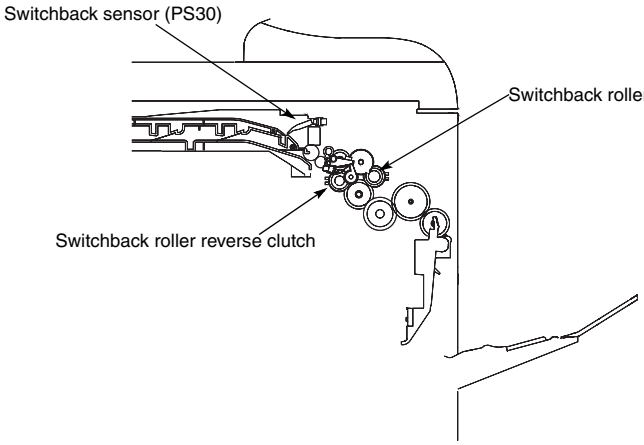

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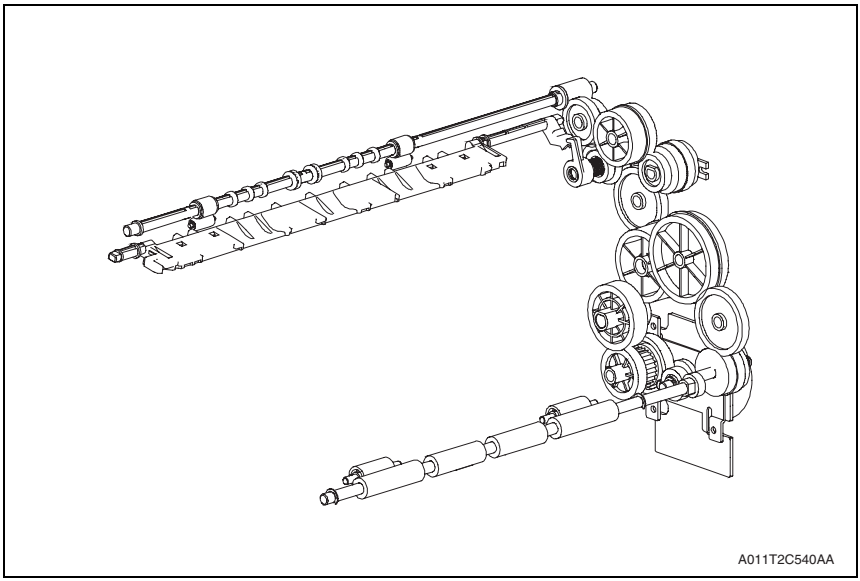
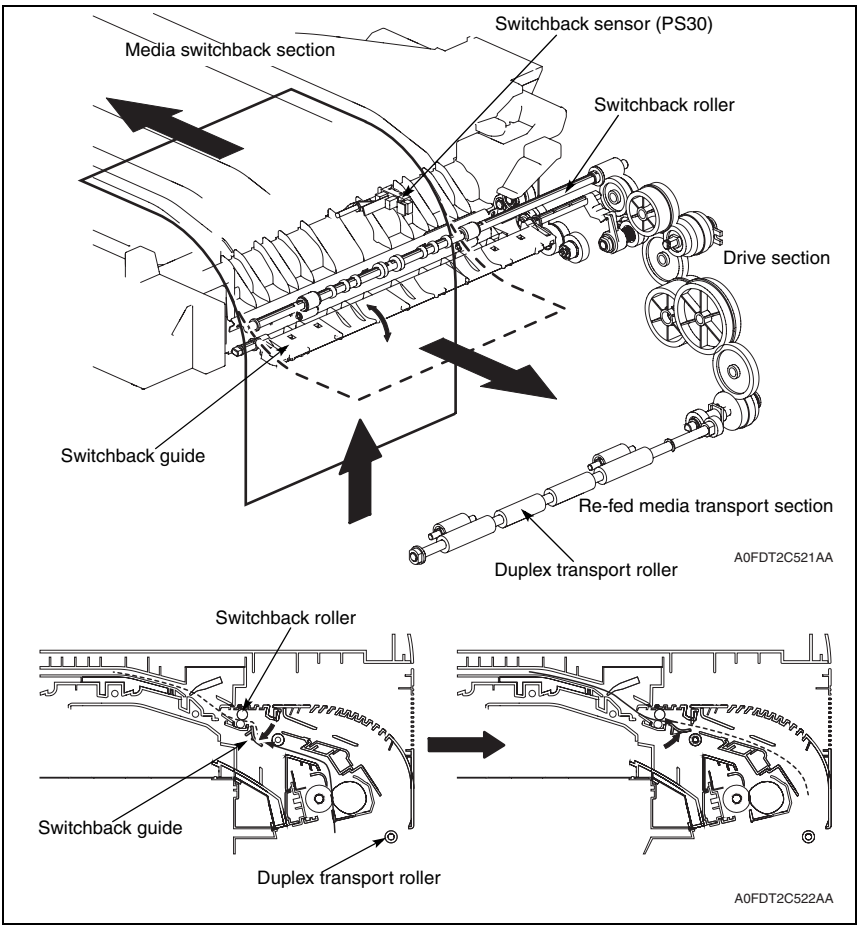
22.2 Drive



22.3 Operation

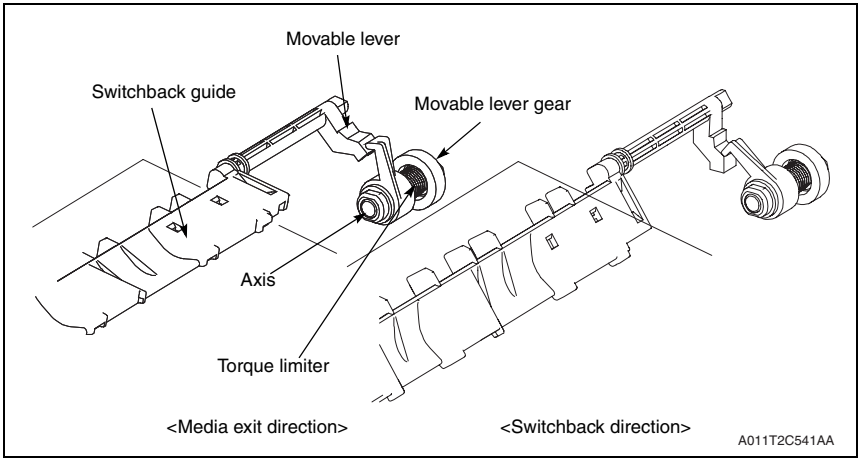
22.3.1 Outline

- As the duplex system doesn't have its dedicated motor and board, the media exit roller, switchback roller, Duplex transport roller are driven by the fusing motor. Media is transported to exist out direction or to switchover roller direction controlled with the switchback guide.
- This model is provided with the switchback roller and its route control system, which enables the machine to achieve 100% productivity of duplex print of A4/LTR.
- The media transported from the fusing unit is temporarily stored in the horizontal conveyance section. It is then transported into the duplex section via the switchback roller.



22.3.2 Switchback guide movable mechanism

- The movable lever rotates driven by the fusing motor to push down the switchback guide. When the guide reaches to the bottom, the lever cannot be driven due to the torque limiter between the movable lever axis and the gear. The guide goes back to the upper position with the spring that rotates the gear backward and pushes up the switchback guide.

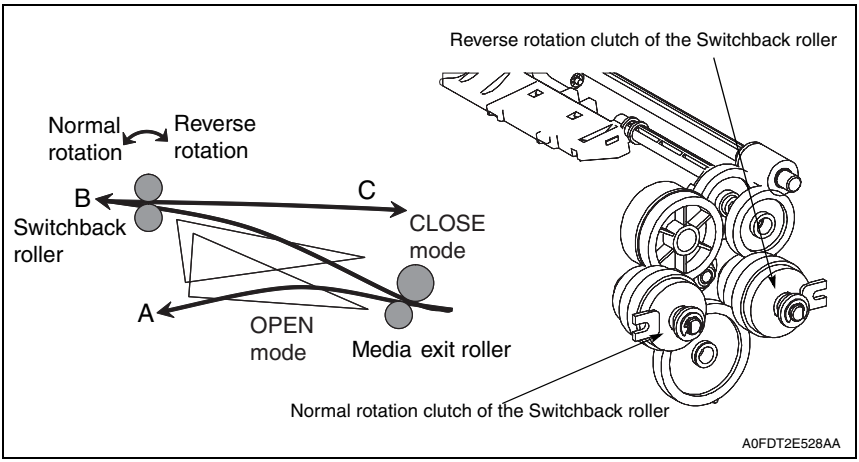


22.3.3 Media exit switching mechanism

- The position of the switchback guide and normal/reverse rotation of the switchback roller are controlled with the combination of the two clutches, DUP normal rotation clutch and DUP reverse rotation clutch. Both clutches cannot be turned ON at the same time. When the switchback roller rotate forward, the switchback guide OPEN, while the switch over guide CLOSE when the roller rotates backward.

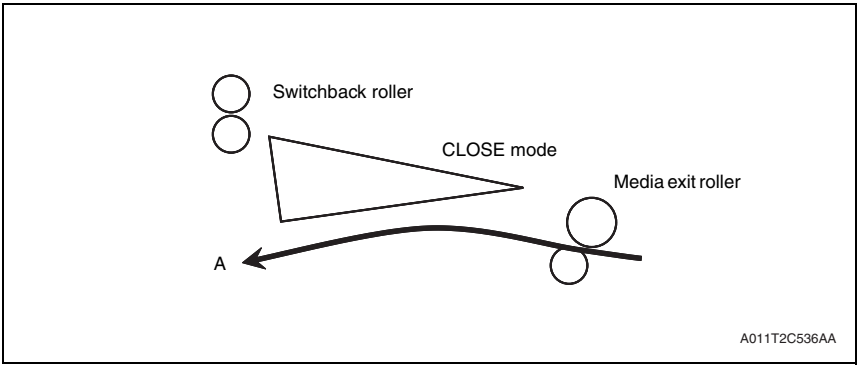
A. DUP normal/reverse rotation clutch motion

Transportation route	Switchback roller rotating direction	Normal rotation clutch	Reverse rotation clutch	Switchback guide mode
A	Stopping	OFF	OFF	CLOSE
B	Normal rotation	ON	OFF	OPEN
C	Reverse rotation	OFF	ON	CLOSE



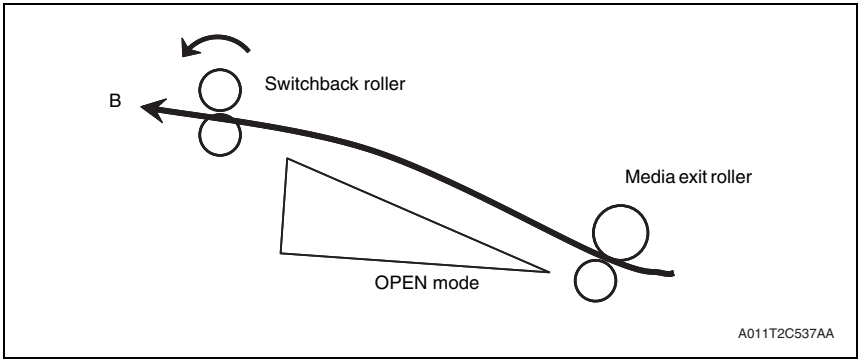
(1) Single-side printing

- Media exits outside the machine with the switchback gate in CLOSE mode.
- The switchback roller mode is stopping.

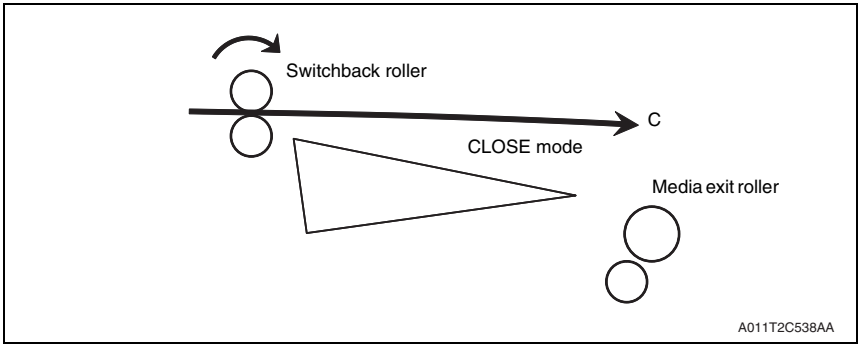


(2) Duplex printing

1. The switchback guide turns to the OPEN mode and the media is transported to the direction of the switchback roller.
2. The switchback roller rotates forward.

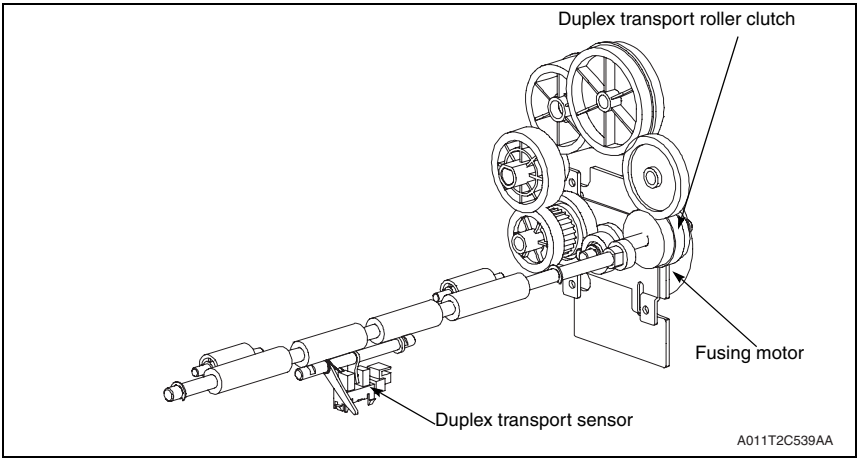


3. The switchback guide becomes CLOSE mode after the back end of the media passes through the media exit roller, and the switchback roller starts rotating backward to send the media to the duplex unit direction.



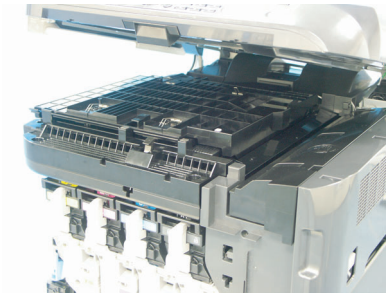
22.3.4 Transport /Media re-feed mechanism

- Duplex transport section is driven by the fusing motor.
- Transportation is controlled by the transport roller clutch.
- Duplex transport sensor controls the stop position of the media at media re-feeding and detects JAM.



23. Horizontal conveyance section

23.1 Composition



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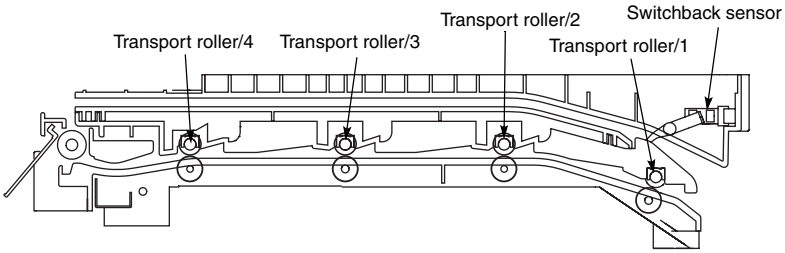

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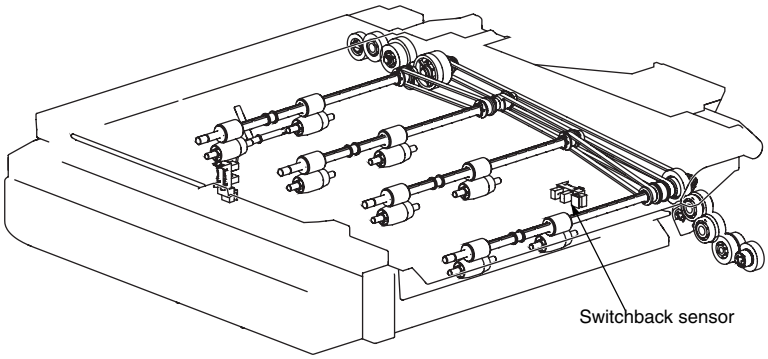

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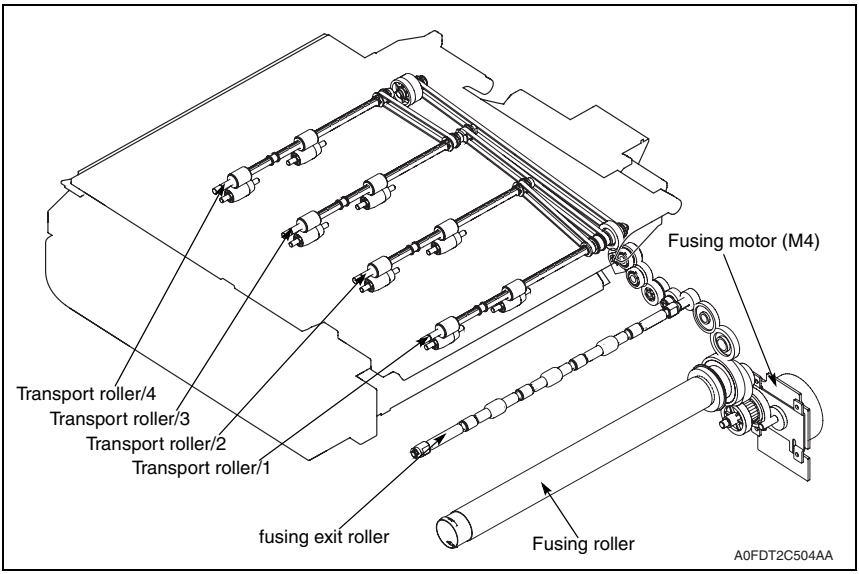
23.2 Drive


Fusing motor (M4)
Transport roller/4
Transport roller/3
Transport roller/2
Transport roller/1
fusing exit roller
Fusing roller
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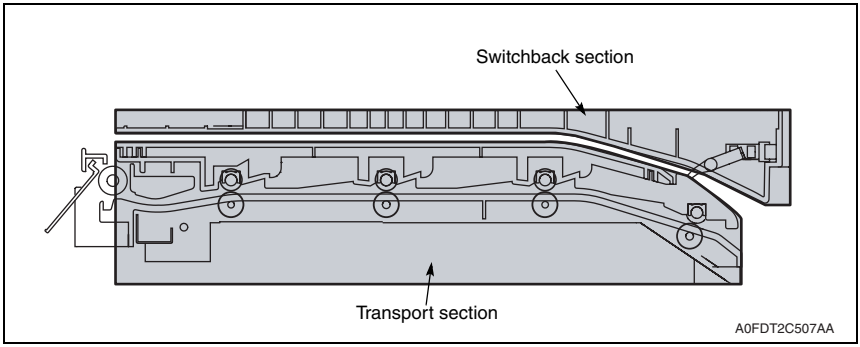
23.3 Operation

23.3.1 Transport control

- The horizontal conveyance section consists of the transport section, which transports media fed from the fusing unit to the exit tray, and the switchback section, which transports the media to the duplex section.



A. Transport section

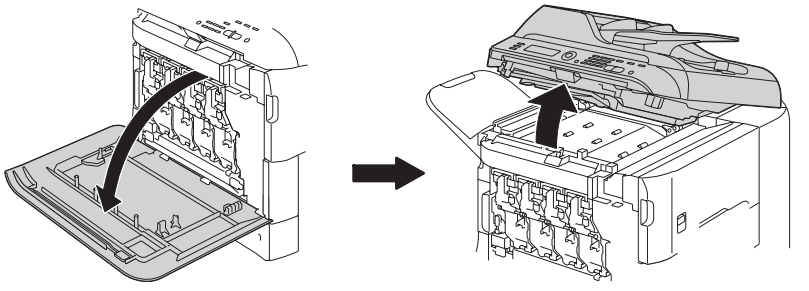
- The transport rollers transport media fed from the fusing unit to the exit tray.
- Each of the transport rollers is driven by the corresponding drive belt via a gear train through the drive provided by the fusing motor.
- Each transport roller is brought to a stop a predetermined period of time after the media has fed into the exit tray.

B. Switchback section

- The switchback section transports the media fed from the fusing unit onto the switchback section and to the duplex section.
- The switchback section provides the drive for transport of the media to the duplex section.
- For the control of media transport to the duplex section, see Switchback/Duplex Section.

23.3.2 Opening and closing the horizontal conveyance section

- The horizontal conveyance section can be opened when the upper door is raised.
- The switchback section can be opened by pushing down the lever after the upper door has been raised.



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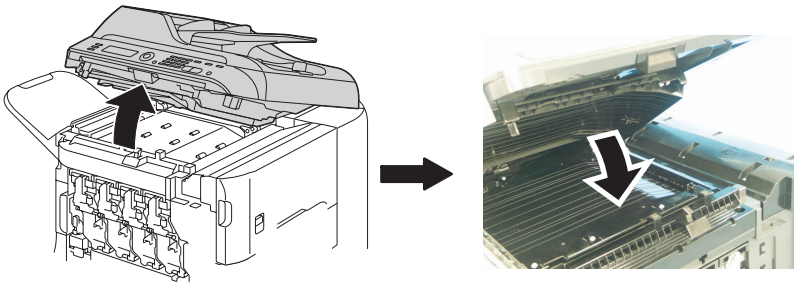

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24. Media exit section

24.1 Composition

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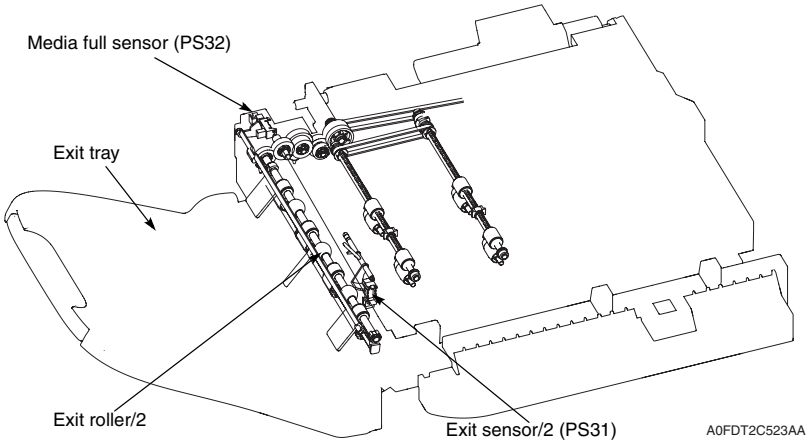
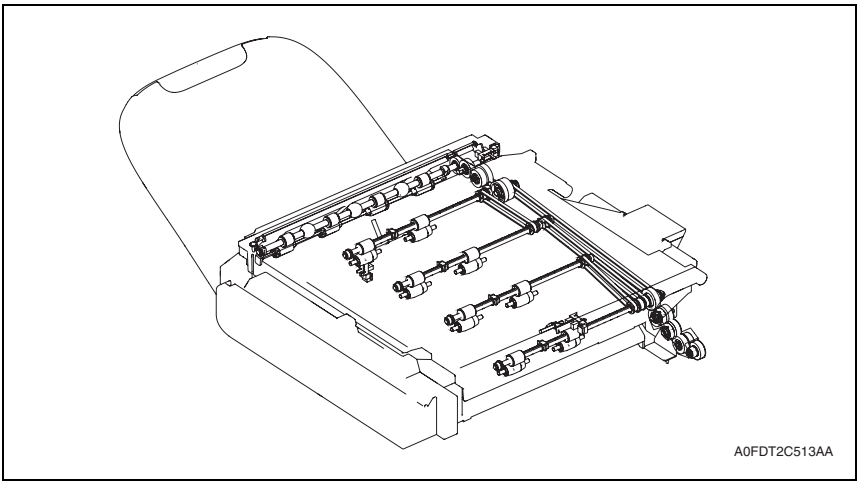


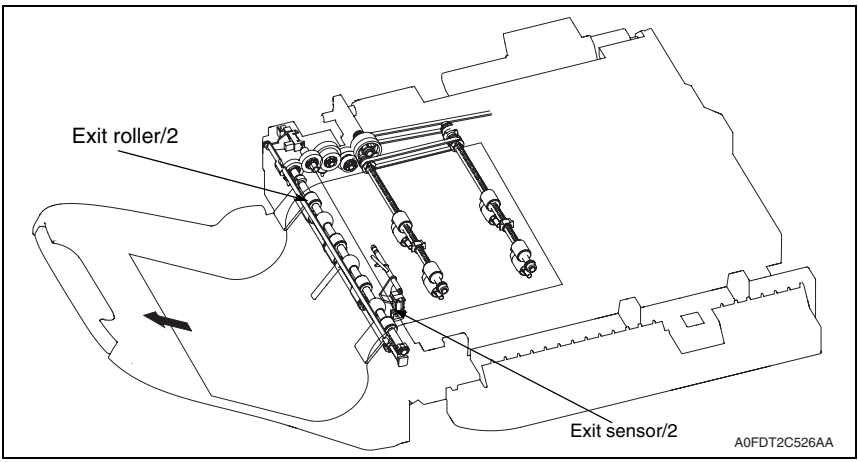
24.2 Drive



24.3 Operation

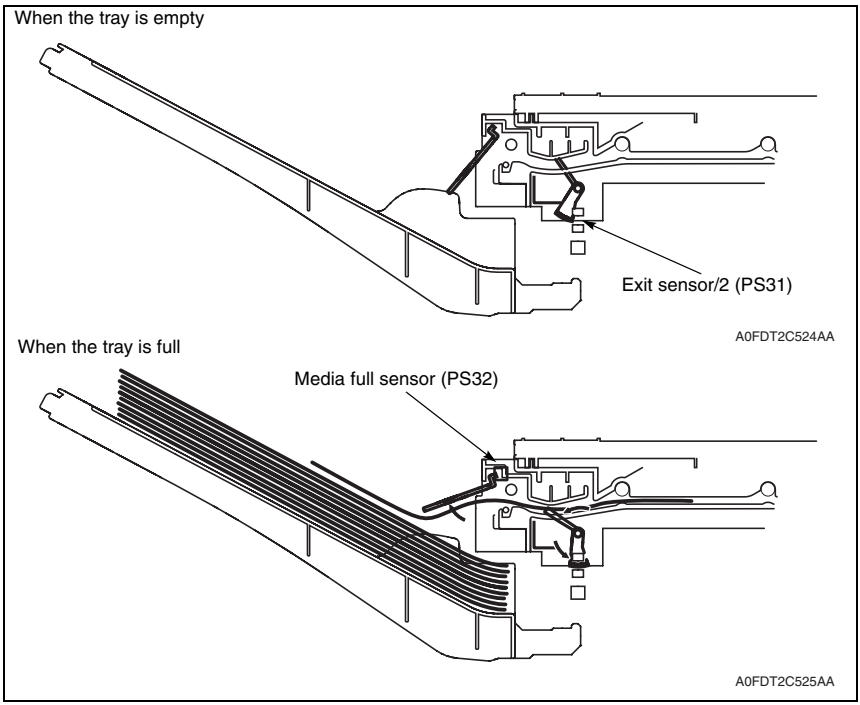
24.3.1 Media exit control

- The media is fed out by the exit roller/2.
- The exit roller/2 is driven by gears and belts using the drive provided by the fusing motor of the main unit.
- The exit sensor/2 mounted in the horizontal conveyance unit detects the media fed out into the exit tray.



24.3.2 Media full detection

- The media full sensor detects the load capacity of output media in the exit tray.
- When the media holding plate is low, the edge of the media holding plate shades the media full sensor.
- When printing starts, the output media pushes up the media holding plate and the edge of the plate activates the media full sensor.
- After all media is discharged, the media holding plate goes down and the edge of the plate shades the media full sensor. If the sensor is shaded, the printed media is judged to not have reached the maximum load capacity yet.
- After all media is discharged, if the output media in the exit tray keeps the media holding plate up and the media full sensor remains activated, the printed media is judged to have reached the maximum load capacity, and the operation panel displays the message.
- If the sensor detects that the exit tray is full, printing is stopped.



25. Image stabilization control

- To ensure that a stabilized output image is produced at all times, a comprehensive control is provided for the developing bias voltage, laser light intensity, registration correction, gamma characteristics detection, and other parameters.

25.1 Overview of image stabilization control

- Image stabilization control may be divided into three types: complete correction control, simplified correction control, and individual registration control. The following explain specific details of each type of control.

25.1.1 Complete correction control

- Controls 1 through 6 below are collectively called the “complete correction control.”
- For details of each of these controls, see the relevant page.

	Control name	Purpose
1	IDC sensor offset value check	To check the low gain output value and offset voltage value of the IDC sensor when the shutter is closed.
2	IDC sensor calibration control	Changes in various types of characteristics due to change with time of the IDC sensor (deteriorated LED, dirty sensor surface), part-to-part variations in the sensors, and change of environment affect the IDC Sensor output corresponding to the clear transfer belt surface. To correct fluctuations in the output, the sensor LED intensity is adjusted so as to keep constant the IDC sensor output value.
3	Developing bias Vpp control	If the developing bias voltage (Vpp) is too high for the Ds distance in each toner cartridge, a leak image (background leak, image area leak) results. If Vpp is excessively low, halftone reproducibility becomes poor. This control detects a Vpp range, in which no image failure occurs, to set the optimum Vpp.
4	Developing bias control (control of the maximum amount of toner sticking to the transfer belt)	To correct the target amount of toner sticking to the transfer belt to form the solid image.
5	Laser light intensity control	To correct the target level of fluctuations in fine line reproduction and reverse image (white on black) reproduction that occur due to variations in photo conductor electrostatic characteristics, developing characteristics, and transfer characteristics (part-to-part variations, environment, durability).
6	Gamma characteristics detection control	To correct the tone by using the IDC sensor to measure the density of a gradation pattern produced on the transfer belt and sending the results of the measurement to the controller.
7	Registration correction control	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions.

25.1.2 Simplified correction control

- If the simplified correction control is not effective in making a good correction, the complete correction control is executed.

	Control name	Purpose
1	IDC sensor offset value check	To check the low gain output value and offset voltage value of the IDC sensor when the shutter is closed.
2	IDC sensor reflection output	To check the low gain output value of the IDC sensor using the intensity value set last for the clear transfer belt surface on which no toner sticks.
3	Developing bias control (simplified Vpp check)	To determine whether there is a leak based on the measurement value taken last.
4	Developing bias duty control (control of the maximum amount of toner sticking to the transfer belt)	To correct the amount of toner based on the measurement value taken last.
5	Laser light intensity control (simplified correction control)	To correct based on the measurement value taken last.
6	Registration correction control (simplified control)	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions. The simplified control uses a simplified registration pattern to make the correction.

25.1.3 Individual registration control

	Control name	Purpose
1	IDC sensor reflection output	To check the low gain output value of the IDC sensor using the intensity value set last for the clear transfer belt surface on which no toner sticks.
2	Registration correction control (simplified control)	To correct incorrect color registration that occurs due to variations in parts of the main body used for regulating different drawing positions.

25.1.4 Image stabilization control execution request

- A request for execution of the complete correction control, simplified correction control, or individual registration control is made at the following timing.

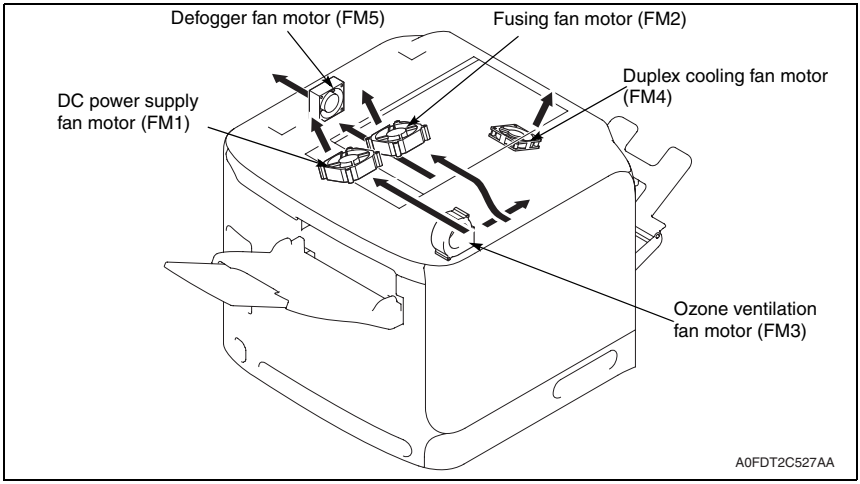
Stabilization request timing		Stabilization request detection timing	Execution processing
Upon replacement of unit	When a new IU is detected	When the power switch is turned ON	Complete correction control
	When a other used IU is detected		
	When the transfer belt unit is replaced *1	When the front/right door is closed	Complete correction control
By main body status	When the power switch is turned ON	Power the switch is turned ON	Depending on each condition
	When there is a great change in environmental conditions from those when the last stabilization sequence was executed.	Power the switch is turned ON/When the front/right door is closed/At the end of a job/ When the sleep mode is deactivated	Complete correction control
	When there is a temperature change inside the PH unit	When the front/right door is closed/At the end of a job/during a job/When the sleep mode is deactivated	individual registration control
	At the end of a print cycle of given conditions	At the end of a job	Simplified correction control
	When a malfunction is reset	When the power switch is turned ON	Complete correction control
User selection	When quality menu/calibration/AIDC process is selected	When quality menu/calibration/AIDC process is selected	Complete correction control

*1: Since the main body is not provided with a function that detects a new transfer belt unit, quality menu/calibration/AIDC process must be selected and complete correction control executed whenever the unit has been replaced with a new one.

26. Miscellaneous

26.1 Fan control

26.1.1 Composition


Defogger fan motor (FM5)
Fusing fan motor (FM2)
Duplex cooling fan motor (FM4)
DC power supply fan motor (FM1)
Ozone ventilation fan motor (FM3)
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26.1.2 Function

A. DC power supply fan motor

- Discharges heat generated from the interior parts (including the DC power supply, intermediate transfer belt section, toner cartridges/C, M, Y, and motor drives) from the main body to prevent the interior temperature from rising inordinately.

B. Fusing fan motor

- Fusing fan motor discharges heat generated from the interior parts (including the DC power supply, fusing unit, toner cartridges/K, and motor drives) out of the main body to prevent the interior temperature from rising inordinately.
- Air passageway is formed on top of the DC power supply, in the duct inside the toner cartridge rail, and below the print head housing. No air flows through areas around the toner cartridges. This effectively prevents toner from scattering.

C. Ozone fan motor

- Discharges heat generated from the print head from the main body to prevent the print head temperature from becoming inordinately high.
- Removes ozone produced from the toner cartridges and charging section.
- Air passageway is formed on top of the DC power supply, in the duct inside the toner cartridge rail, and below the print head housing. No air flows through areas around the toner cartridges. This effectively prevents toner from scattering.

D. Duplex cooling fan motor

- To avoid temperature increase at the fusing section, heat stagnating in the fusing section will be discharged out of the machine.

E. Defogger fan motor

- Heat accumulated inside the scanner section will be discharged in order to avoid temperature increase at the scanner section.
- To prevent condensation from forming in the horizontal conveyance section.

26.1.3 Control

A. DC power supply fan motor control

<Full speed rotation conditions>

- For the period of time that begins when the warm-up cycle is started and ends when a predetermined period of time elapses after the warm-up cycle has been completed.
- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.
- For the period of time during when the fusing pressure roller deformation prevention control is performed under the power save mode.
- For the period of time when the thermistor provided in the print head detects the temperature of predetermined degrees or more.
- During when the image stabilization control is performed

<Half speed rotation conditions>

- The motor runs at a half speed during any time other than above.

<Forced stop condition>

- A malfunction occurs, but not when an error occurs.

B. Fusing fan motor control

<Full speed rotation conditions>

- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.
- For the period of time when the thermistor provided in the print head detects the temperature of predetermined degrees or more.
- During when the image stabilization control is performed

<Half speed rotation conditions>

- The motor runs at a half speed during any time other than above.

<Stop conditions>

- Stopped in the power save mode. However, the motor is not stopped for a predetermined period of time after a print cycle has been completed.
- The temperature of the Fusing roller is below the specified one.

<Forced stop condition>

- For the period of time that begins when the warm-up cycle is started and ends when the warm-up cycle is complete.
- A malfunction occurs, but not when an error occurs.

C. Ozone ventilation fan motor

<Full speed rotation conditions>
- At the start of a warm-up cycle
- During a print cycle
- During when the image stabilization control is performed
- For the period of time when the thermistor/3 provided in the print head detects the temperature of predetermined degrees or more

<Stop conditions>
- A predetermined period of time elapses after a warm-up cycle is completed
- At the end of a print cycle
- During the power save mode. The motor is not, however, stopped for a predetermined period of time after a predrive is complete.

<Forced stop condition>
- A malfunction occurs, but not when an error occurs.

D. Duplex cooling fan motor control

<Full speed rotation conditions>
- For the period of time when the thermistor provided in the print head detects the temperature of predetermined degrees or more
- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.
- During when the image stabilization control is performed

<Stop conditions>
- During the power save mode.
- During the light door open.
- During the warm-up cycle.
- A print cycle is being carried out using transparency

<Half speed rotation conditions>
- A malfunction occurs, but not when an error occurs.

E. Defogger fan motor

<Full speed rotation conditions>
- For the period of time that begins when the warm-up cycle is started and ends when a predetermined period of time elapses after the warm-up cycle has been completed.
- For the period of time that begins when a print cycle starts and ends when a predetermined period of time elapses after the print cycle has been completed.

<Stop conditions>
- During the power save mode.
- A predetermined period of time elapses after a warm-up cycle is completed
- A predetermined period of time elapses after a print cycle has been completed

<Half speed rotation conditions>
- A predetermined period of time after a warm-up cycle is completed
- A predetermined period of time after a print cycle has been completed

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KONICA MINOLTA

SERVICE MANUAL THEORY OF OPERATION

Auto Document Feeder Unit

2008.05
KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, is shown at the left margin of the revised section.
  The number inside represents the number of times the revision has been made.

- To indicate clearly a page that contains the revision, is shown near the page number of the corresponding page.
  The number inside represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2008/05	1.0	—	Issue of the first edition

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Auto document feeder unit

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Outline

1. Product Specifications

A. Type

Name	Automatic Document Feeder
Installation	Inserted at upper-rear side of main body
Document alignment	Center
Document loading	Face up

B. Functions

Modes	1-Sided Mode / 2-Sided Mode

C. Paper

Type of document	1-Sided mode: 50 g/m^2 to 128 g/m^2	
	2-Sided mode: 50 g/m^2 to 128 g/m^2	
Detectable document size	A5S, B5S, A4S, LegalS (8.5 x 14), LetterS (8.5 x 11), Invoice (8.5 x 5.5)	
	Width	140 to 216 mm
	Length	148 to 355.6 mm
Capacity	50 sheets (80 g/m^2) or load height of 8 mm or less.	

D. Maintenance

E. Paper feed prohibited originals

- The following types of originals should not be used.

Types of document	Possible malfunctions
Original that is stapled or clipped.	Feed failure, damage to the original, or drive failure due to clip clogging
Pasted originals	Misfeed, broken original, or folded paste-up edges
Book original	Feed failure, damage to the original, or drive failure
Original weighing less than 35 g/m^2 or 210 g/m^2 or more	Feed failure
Torn original	Feed failure, damaged sheet
Highly curled original (15 mm or more)	Original misfeed due to dog-ear or skew
OHP transparencies	Feed failure
Label Sheet	Feed failure
Photographic paper, gloss enamel paper, or other gloss original	Feed failure, damage to the original, or drive failure
Offset master	Feed failure
Sheets clipped or notched	Damaged sheet
Less-than-0.05-mm-thick thin paper	Misfeed
More-than-0.15-mm-thick thin paper	Misfeed

F. Paper feed not guaranteed originals

- If fed, paper feed will be possible to some extent but trouble occurrence will be possible.

Type of original	Possible trouble
Sheets lightly curled (Curled amount: 10 - 15 mm)	Dog-eared, exit failure
Heat sensitive paper	Edge folded, exit failure, transport failure
Translucent paper	Take-up failure, transport failure
Paper immediately after paper exit from the main unit	Take-up failure, transport failure
Paper with many punched holes (e.g., loose leaf) limited to vertical feeding	Multi-page feed due to flashes from holes
Sheets with 2 to 4 holes	Transport failure
Sheets two-folded or Z-folded	Transport failure, image deformation
Sheets folded	Image deformation, multi-page feed, take-up failure

G. Machine specifications

Power requirements	DC 24 V (supplied from the main body)
	DC 5 V (supplied from the main body)
Max. power consumption	30 W or less
Dimensions	506 mm (W) x 432 mm (D) x 89 mm (H) 20 inch (W) x 17 inch (D) x 3.5 inch (H)
Weight	4.5 kg (10 lb)

H. Operating

- Conforms to the operating environment of the main body.

NOTE

These specifications are subject to change without notice.

Composition/operation

2. Composition

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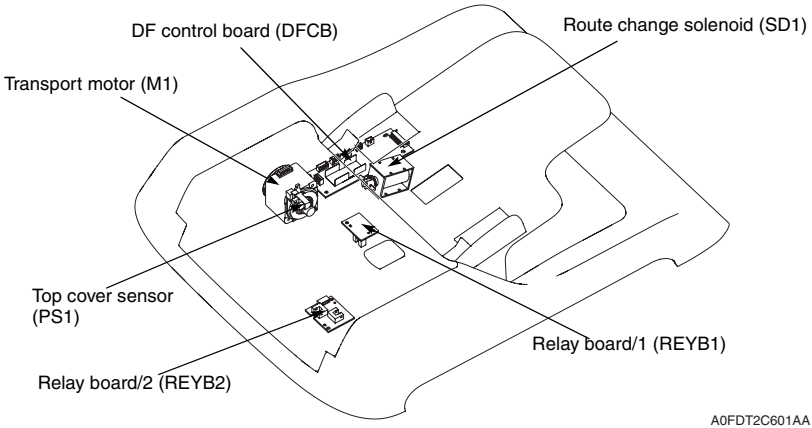

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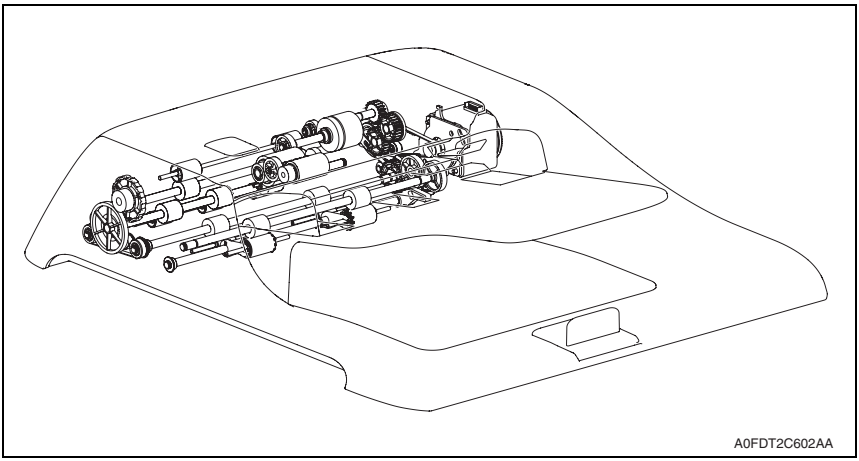
3. Drive

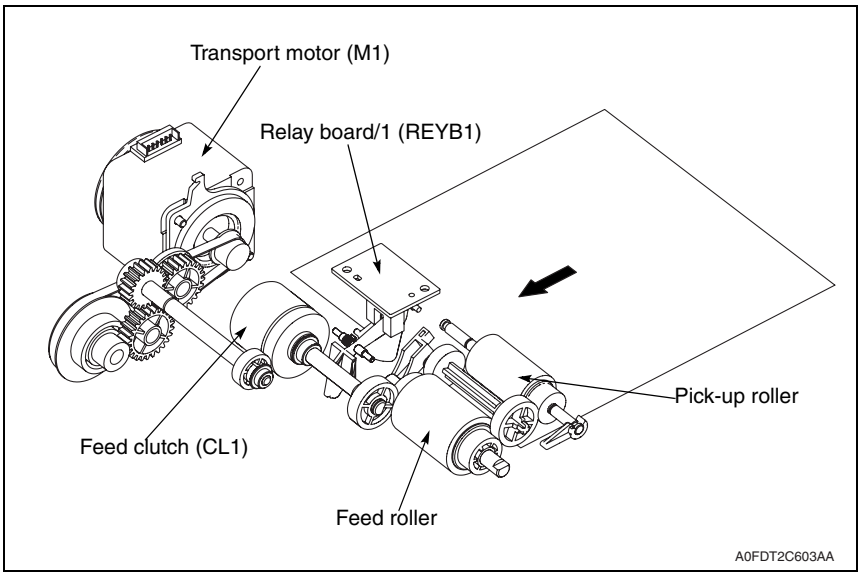


4. Mechanical operations

4.1 Document feed mechanism

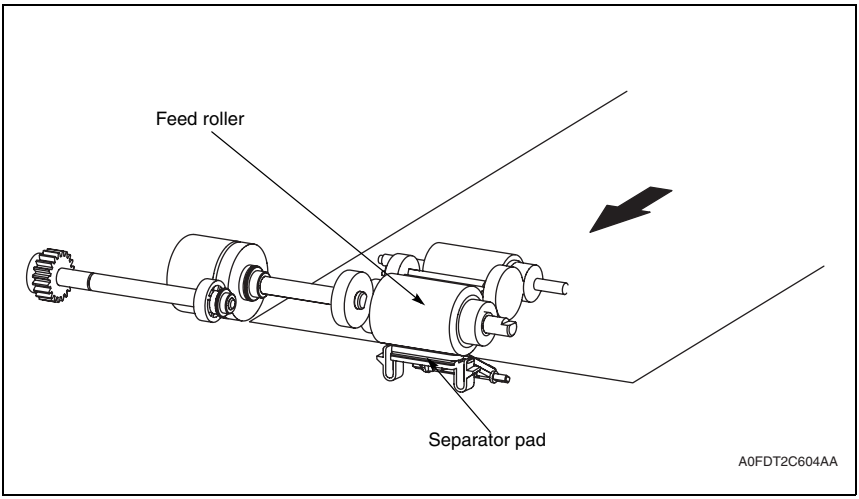
4.1.1 Document feed mechanism

- The leading edge detection sensor mounted on relay board/1 detects a document that has been properly loaded in the document feeder.
- The document stopper establishes the leading edge position of the document loaded in the document feeder. The stopper is lowered in the standby state and raised when the document is taken up and fed in.
- The document stopper is raised and lowered in synchronism with the raising and lowering motion of the pick-up roller.
- The pick-up roller and feed roller turn to take up and feed the original properly.
- The pick-up roller transports the original up to the feed roller.
- The transport motor drives the pick-up roller and feed roller through a gear train and the feed clutch.

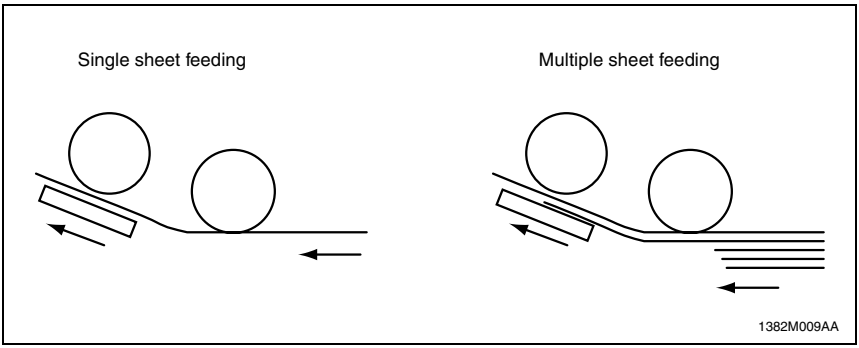


4.1.2 Document separation mechanism

- Double feeding of paper is prevented using coefficient of friction between the feed roller and separator pad.



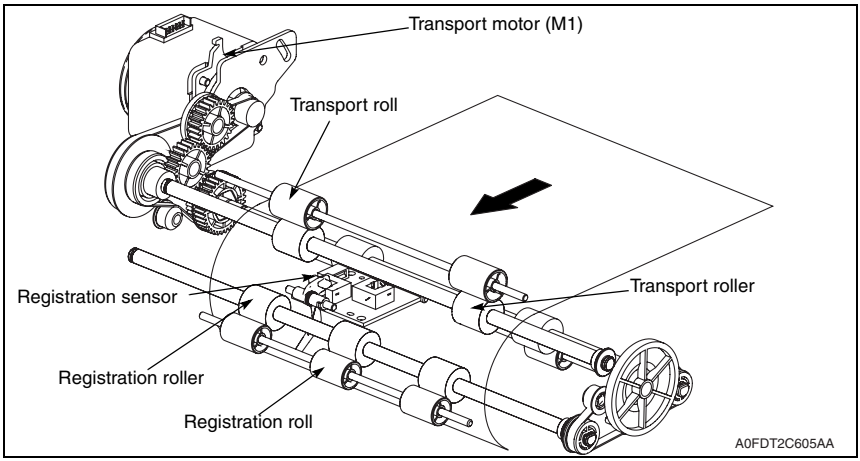
Single sheet feeding	:	The coefficient of friction on the front side of the paper fed between the take-up roller and separator pad is equal to that on the backside of the paper. This allows the take-up roller to transport the paper.
Multiple sheet feeding	:	The coefficient of friction between the paper and separator pad is greater than that between sheets of paper. This allows only the first sheet of paper to be transported by the take-up roller.



4.2 Document transport/exit mechanism

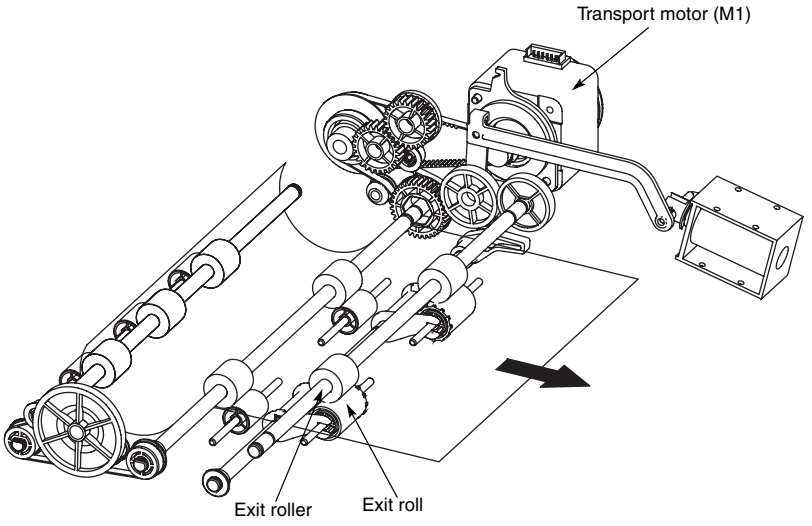
4.2.1 Document transport mechanism

- The transport roller turns to transport the original that has been taken up onto the document scanning position of the printer.
- The transport motor drives the transport roller through a gear train.
- When the original reaches the document scanning position, the registration sensor mounted on the relay board is unblocked by the actuator, which causes the printer to determine that there is an original.



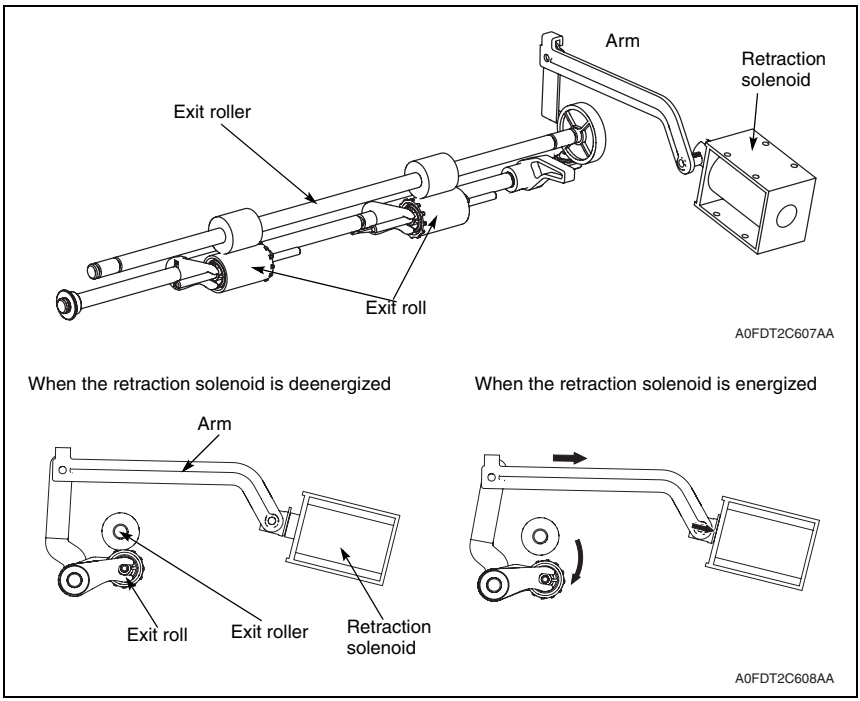
4.2.2 Document exit mechanism

- The exit roller turns to feed the original out of the document feeder and onto the document exit tray.
- The transport motor turns the exit roller through a gear train.



4.2.3 Switching mechanism for turnover/paper exit

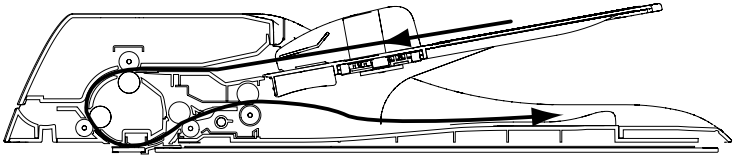
- The original transferred from the transport section will switch back or exit by the exit roller and the exit switch back roller.
- The exit switch back roller is driven by the exit motor.
- During the turnover operation, the exit rolls are pressed against, or retracted from, the exit roller to prevent the leading and trailing edges of the original from being pinched between the roller and rolls.
- Pressure and retraction operations are performed by energizing or deenergizing the retraction solenoid.
- When the retraction solenoid is energized, the arm is operated to move the exit rolls away from the exit roller.



4.3 Paper path

4.3.1 1-sided mode

- When the start key is pressed, take-up and feeding of the original will be started by the transport motor and take-up clutch.
- The original that has been taken up and fed in is transported to the exit tray by way of the registration roller and exit roller.



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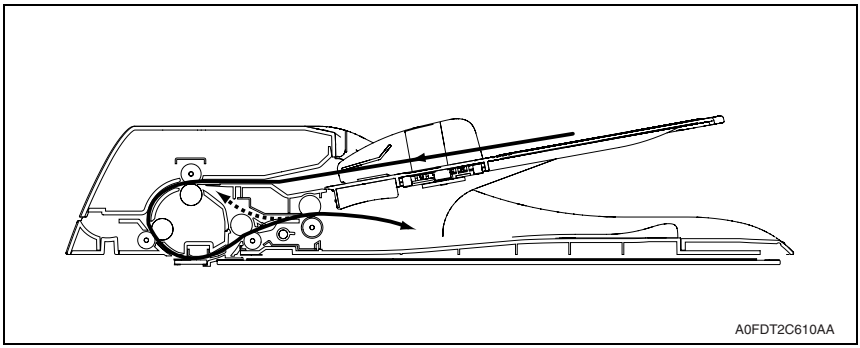
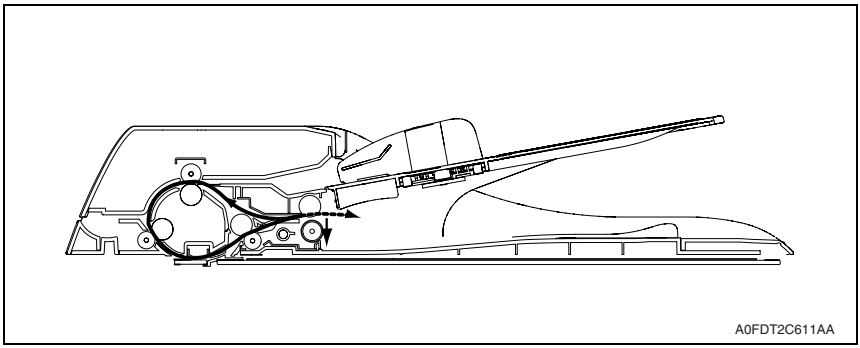
4.3.2 2-sided mode

1. The fist side of the original will be read.
2. The exit roller turns backward to feed the original back into the document feeder.



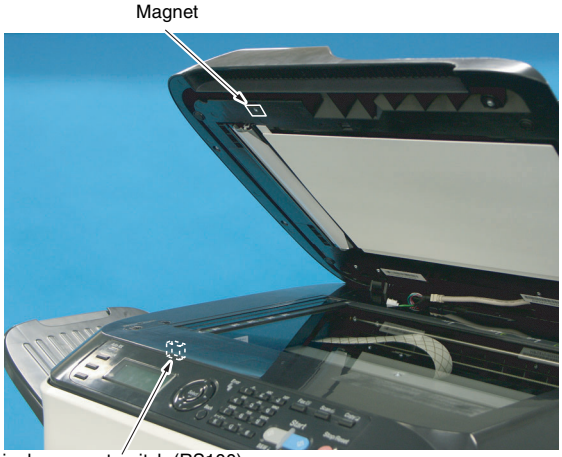
3. The original that has been taken up again from the exit tray is transported up to the document scanning position by way of the registration roller.
4. As soon as the original reaches the document scanning position, a read sequence of the second side of the original will be started.
5. The original that has been read is fed into the exit tray via the exit roller. At this time, the exit rolls are moved away from the exit roller to prevent the leading and trailing edges of the original from being pinched between the roller and rolls.
6. In order to keep the proper order of the original, the original fed out into the exit tray is taken up again and transported through the registration roller and exit roller back into the exit tray.



4.4 Miscellaneous

4.4.1 Document feeder raised/lowered position detection mechanism

- There is a magnet provided in the document feeder, allowing the printer to detect the position of the document feeder whether the document feeder is raised or lowered.
- This magnet attracts the original cover set switch provided on the printer side, thus activating the sensor. The printer will then detect the position of the document feeder.



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KONICA MINOLTA

SERVICE MANUAL THEORY OF OPERATION

Lower Feeder Unit

2008.05

KONICA MINOLTA BUSINESS TECHNOLOGIES, INC. Ver. 1.0

Revision history

After publication of this service manual, the parts and mechanism may be subject to change for improvement of their performance.
Therefore, the descriptions given in this service manual may not coincide with the actual machine.

When any change has been made to the descriptions in the service manual, a revised version will be issued with a revision mark added as required.

Revision mark:

- To indicate clearly a section revised, is shown at the left margin of the revised section.
  The number inside represents the number of times the revision has been made.

- To indicate clearly a page that contains the revision, is shown near the page number of the corresponding page.
  The number inside represents the number of times the revision has been made.

NOTE

Revision marks shown in a page are restricted only to the latest ones with the old ones deleted.

- When a page revised in Ver. 2.0 has been changed in Ver. 3.0:
  The revision marks for Ver. 3.0 only are shown with those for Ver. 2.0 deleted.
- When a page revised in Ver. 2.0 has not been changed in Ver. 3.0:
  The revision marks for Ver. 2.0 are left as they are.

Date	Service manual Ver.	Revision mark	Descriptions of revision
2008/05	1.0	—	Issue of the first edition

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Lower feeder unit

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Outline

1. Product specifications

A. Type

Name	Add-on 500-sheet media feed cassette
Type	Front-loading type
Installation	Desk type
Media feeding system	Media separation by a small-diameter roller with torque limiter
Document alignment	Center

B. Media type

Media size	B5S(JIS)/Executive/LetterS/A4S/Letter Plus/G-Legal/Legal
Media type	• Plain paper: 60 to 90 g/m² (16 to 24 lb) • Recycled paper: 60 to 90 g/m² (16 to 24 lb)
Capacity	500 sheets

C. Machine specifications

Power Requirements	DC 24 V ± 10% (supplied from the main body)
	DC 5 V ± 5%
Max. Power Consumption	16 W
Dimensions	469 mm (W) × 536 mm (D) × 111.5 mm (H) 18.5 inch (W) × 21.0 inch (D) × 4.5 inch (H)
Weight	Approx. 6.5 kg (14.25 lb)

D. Operating environment

Temperature	10° to 35° C/50° to 95° F (with a fluctuation of 10° C/h (18° F/h))
Humidity	15% to 85% (with a fluctuation of 20%/h)

NOTE
These specifications are subject to change without notice.

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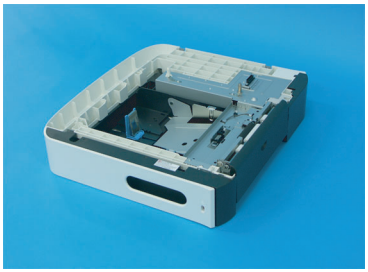
Composition/Operation

2. Overall composition



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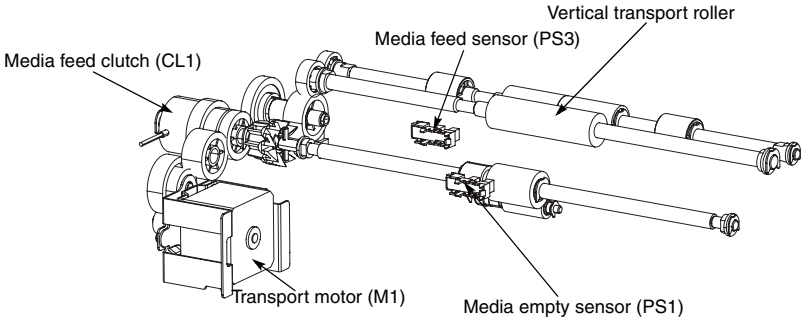

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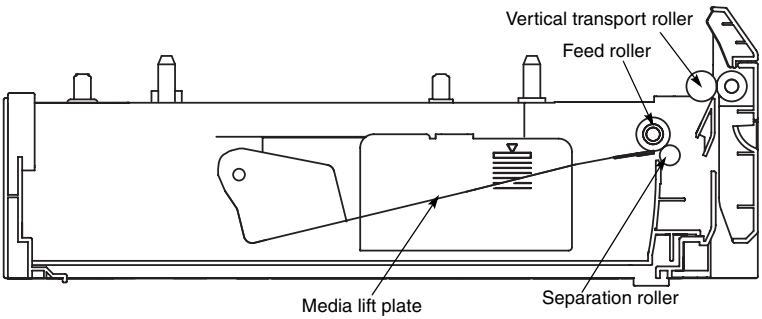

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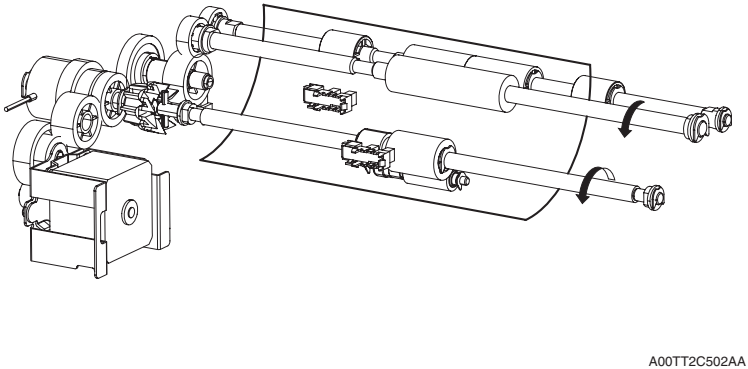
3. Drive

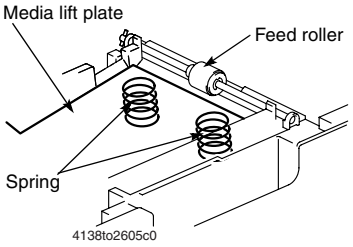


4. Operations

4.1 Media feed control

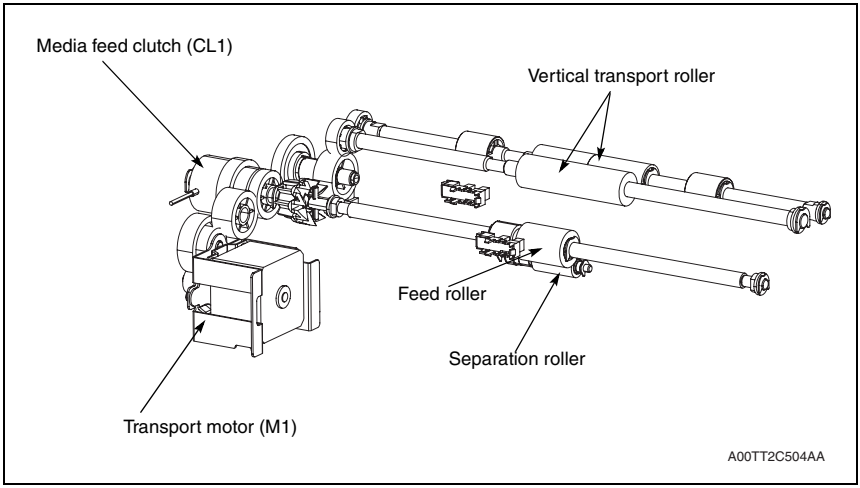
4.1.1 Media lift plate mechanism

- The media lift plate is pressed down into the locked position (in which the media is loaded in position).
- Load a media stack and then slide the tray into the main body. This unlocks the media lift plate.
- The media lift plate (media stack) is pressed against the feed roller.
- The media lift plate (media stack) is pressed upward by the springs at all times.



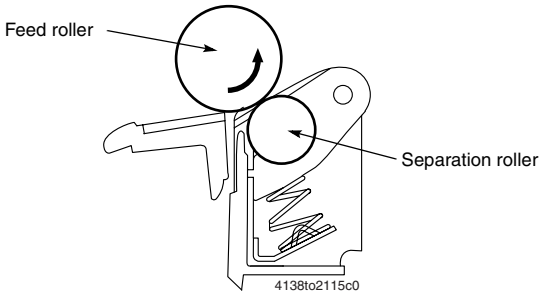
4.1.2 Feed roller/vertical transport roller control

- The feed roller and vertical transport roller are rotated, which feeds media from the lower feeder unit and conveys it further into the inside of the main body
  1. The transport motor is energized to turn the vertical transport roller.
  2. The media feed clutch is energized to turn the feed roller.
  3. The media is fed in by the feed roller.
  4. The media fed in by the feed roller is conveyed onto the synchronizing roller of the main body by the vertical transport roller.
  5. When the media feed sensor is activated and then the media is conveyed onto a predetermined point in the media path, the media feed clutch is de-energized, thus bringing the feed roller to a stop. The vertical transport roller thereafter takes charge of conveying media further.
  6. When the trailing edge of the last sheet of media moves past the registration sensor, the transport motor is de-energized to bring the vertical transport roller to a stop.



4.1.3 Media separation mechanism

- A separation roller provided with a torque limiter is used to prevent double feeding of media.

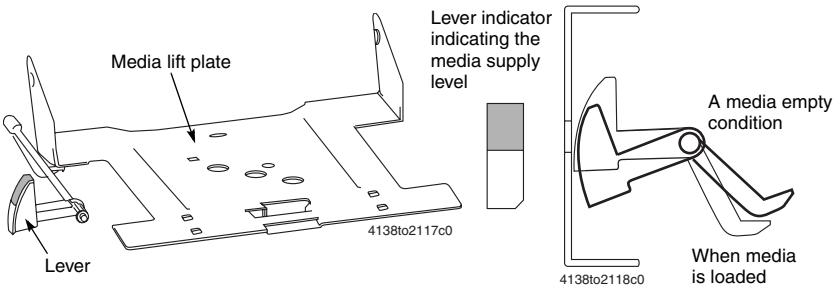


4.1.4 Media detection mechanism

- The media feed sensor detects the media fed in by the feed roller.
- When two lower feeder units are installed, the sensor detects the media fed off from tray 3.
- When the media feed sensor actuator unblocks the media feed sensor, the main body considers that the media has reached the sensor position.

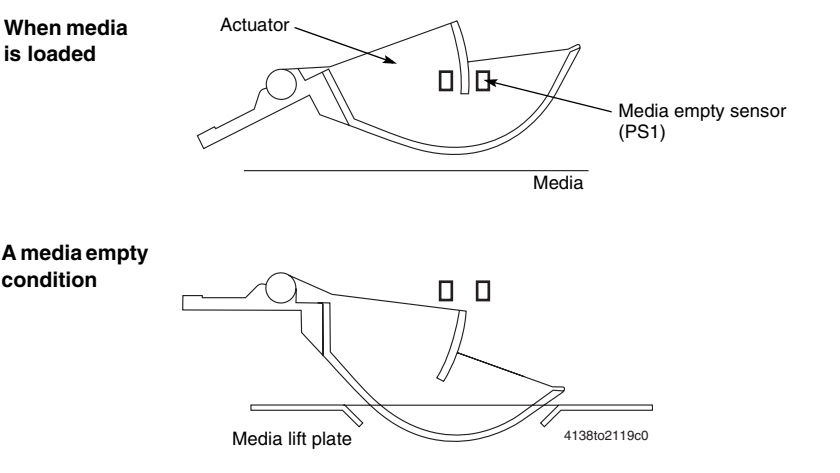
4.1.5 Media supply level detection control

- There is a window in the front cover of the cassette for indicating the media supply level.
- When the media lift plate goes up, a red lever appears in the window. The lower the level of the media stack in the tray, the more red that is visible.



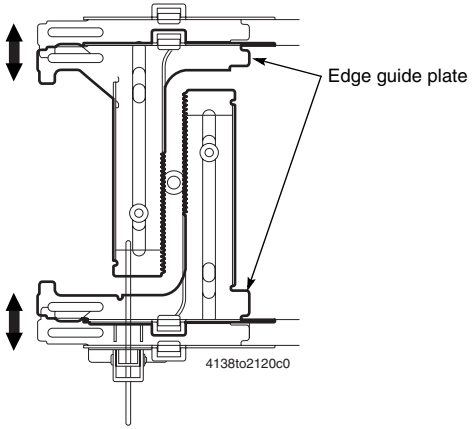
4.1.6 Media empty condition detection control

- The media empty message is displayed on the panel when the empty sensor actuator unblocks the media empty sensor.
- No mechanism is provided for detecting a media near empty condition. The media supply level indicator serves this purpose.



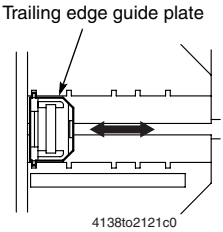
4.1.7 Edge guide plate

- The edge guide plate can be slid to the exact size in the width direction of the media to be loaded (A4, B5, 8/12).



4.1.8 Trailing edge guide plate

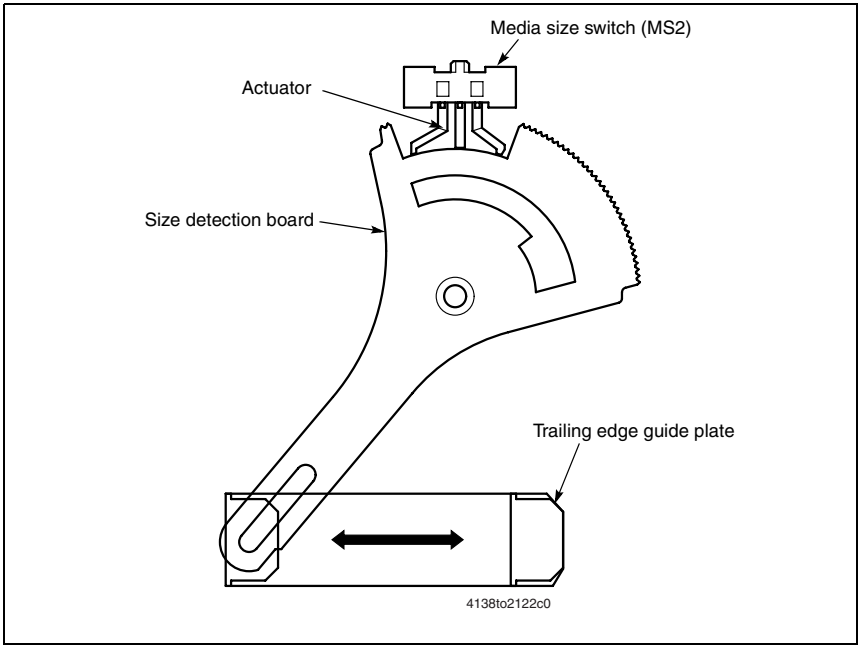
- The trailing edge guide plate can be slid to the exact size in the length direction of the media to be loaded (14 inch, 13 inch, $12^{7}/_{10}$ inch, A4, 11, $10^{1}/_{2}$ inch, B5).



4.1.9 Media size detection control

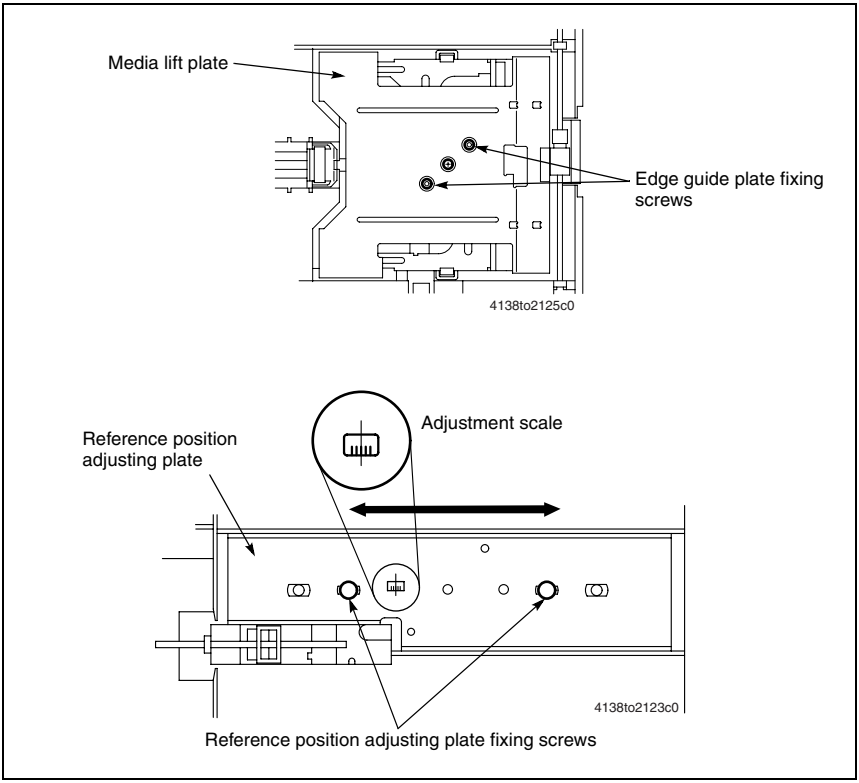
- The media size switch detects the length size (feed direction) of the media.
  1. The size detection board turns as the trailing edge guide plate is moved.
  2. When the tray is slid into the main body, the size detection board pushes the actuator of the media size switch installed to the main body frame, thus turning ON the switch.
  3. The combination of ON/OFF positions of the sub-switches of the media size switch determines the specific media size that can be either one of the seven different sizes.

Lower feeder media size switch			Media size
SW1	SW2	SW3	
OFF	ON	ON	Legal (8.5" × 14")
ON	ON	ON	Government legal letter plus
ON	ON	OFF	A4
ON	OFF	OFF	Letter (8.5" × 11")
ON	OFF	ON	Executive
OFF	OFF	ON	B5
OFF	OFF	OFF	Lower feeder unit not installed



4.1.10 Media reference position adjustment mechanism

- The edge guide plate can be moved to allow the print start reference position for the media to be adjusted.
  1. Through a hole in the media lift plate on top of the tray, loosen two screws that secure the edge guide plate.
  2. Accessing the tray from its bottom surface, loosen two screws that secure the reference position adjusting plate.
  3. Slide the reference position adjusting plate as necessary as indicated on the scale.
  4. From the bottom surface of the tray, tighten the two screws that secure the reference position adjusting plate.
  5. Through the hole in the media lift plate on top of the tray, tighten the two screws that secure the edge guide plate.



4.1.11 Media misfeed detection control

- If the media feed sensor is not activated within a predetermined period of time after a media feed sequence has been started, the main body determines that there is a media misfeed. It then displays a media misfeed message on the panel.
- The media misfeed display can be reset by opening and closing any door.

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